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THE MYTHICAL STRAITS OF ANIAN

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When the great Venetian traveler Marco Polo returned from his Eastern wanderings in 1295 he brought back for the use of geographers and future travelers a fund of information concerning Eastern Asia which was to serve as the main source of such knowledge for the next 500 years. It was thus inevitable that, as the wave of Spanish exploration swept across the newly discovered American continent more than two centuries later, men should instinctively turn to his pages for information concerning that mystic land of Cathay which it was now conceived had been so nearly reached by these new travelers.

As Cortes and his followers pushed forward, however, into the vast regions which lay to the north and west of their first line of entry into the continent, and found little save semi-naked savages where Oriental splendor and civilization were looked for, the first picture gradually faded away, and it was at length realized that more exploration must take place upon and around Balboa's new ocean before the coveted land of Kublai Khan and his descendants could be attained.

But before the passing of this dream the belief that the Chinese Empire had been nearly reached had sufficed to fill the maps of the new continent with kingdoms, cities, rivers and mountains borrowed from Marco Polo or other less well-known Eastern travelers, and these were placed upon the blank spaces or fitted by eager cartographers to suit natural features described by returning voyagers. An instance of this perhaps pardonable professional enterprise is

to be found in Ruysch's map, published in Rome in 1507, and used to illustrate an edition of Ptolemy's works (Fig. 1).

The relationship between the new Spanish discoveries in the Terra Nova and the Asian continent was not yet fathomed, but all of Marco Polo's kingdoms were placed close at hand in the northwest, ready to be absorbed by forthcoming expeditions. Developing the idea a little further, after the discovery of the mainland north of the isthmus, we find that the maker of the MS. map, illustrated in outline (Fig. 2), has placed Prester John and his idolatrous neighbors not very far from Mexico. The name of the maker of this map is not known, but it bears evidence of having been drawn in 1530 or thereabouts, and the original is preserved in the manu-

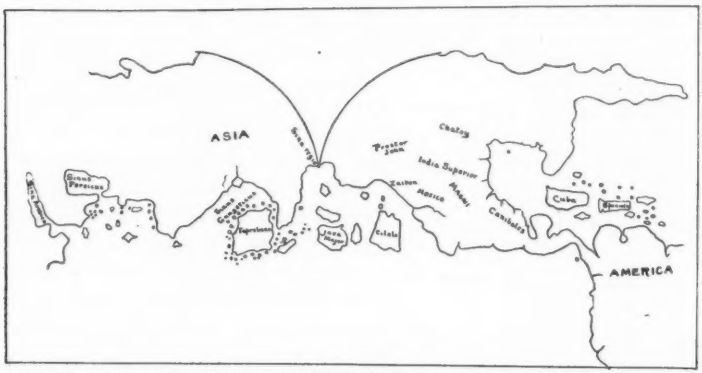

FIG. 2—Outline copy of MS. map in the British Museum, showing connection between Marco Polo's Asia and the new lands (*circa* 1530).

script department of the British Museum, bound in with the medical recipes of a certain John Bowland.[1] The map is crudely drawn and the lettering is hard to decipher with certainty, and so but few names have been transcribed in the outline copy here given; but it will be observed that the port of Zaiton, one of Marco Polo's well-known ports, has been placed upon the west coast of Mexico. The later discoveries of Cortes, together with those of his followers, Francisco de Ulloa and Alarcon, were evidently unknown to the maker of the map.

Balboa's epoch-making discovery of the Pacific was made in 1513 and Magellan's voyage in 1520, and this, in a measure, cleared off the mystery of the southern part of the great new ocean, although coastwise exploration both south and north from the Isthmus of

[1] British Museum. Sloane MSS. 117.

Darien was slow and tedious for purely physical reasons. It was not until Juan Fernandez had taught south-bound voyagers how to make more rapid progress against the southeast trade winds by standing off shore that the way to Peru was made clear. Progress toward the north was equally slow, and it was only by working slowly along shore, taking advantage of the numerous harbors of New Spain and—although this was not yet fully realized—by keeping under the lee of the Californian peninsula that some knowledge of the coast was gained in this direction, in the face of baffling winds and adverse currents.

Although the good Marco had been far more a land traveler than an ocean voyager, he had given a brief description, upon the authority of certain eastern pilots, of the great sea of Chin, wherein lay "no fewer than seven thousand, four hundred and forty islands, mostly inhabited," and including that great and rich island of Zipangu, which itself lay at a distance of about 1,500 miles from the coast of Manji. The hypothetical existence of a sea so vast necessitated the carrying of the western coast of New Spain very far to the north, now that it was understood that all the regions and adjuncts of Asia must perforce lie beyond the new continent.

Castenada, writing probably about 1565, speaks of the connection between New Spain and China as though it were well understood at that time, but with a realization that the connecting isthmus must lie far to the north. Soon after the middle of the century, however, the idea of a dividing strait crept in, and map makers began to take cognizance of it. The authority of Marco Polo still being paramount as regarded Eastern Asia, a further appeal was undoubtedly made to his pages for verification of this new conception.

Any attempt to identify names, as given by the Venetian traveler, with those used 250 years later by geographers and cartographers of various nationalities is beset with many difficulties, inasmuch as his original narrative had no map to key it to, is preserved in more or less fragmentary form, and has suffered greatly at the hands of transcribers and translators who have been entirely unfamiliar with Eastern Asia.

There is, however, little doubt that the name "Anian," which soon became common for the new strait, was originally borrowed from Polo, and that the region in which it was intended to locate this nebulous passage was that described in Chapter 5, Book 3 of his travels.[2]

[2] The Travels of Marco Polo. (Marsden's translation.)

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The author is speaking of the Gulf of Kienan (Tonkin), which, he says, "extends to a distance of two months' navigation along its northern shore, where it bounds the southern part of the province of Manji, and from thence to where it approaches the countries of Ania, Tolman and many others already mentioned." After some description of the gulf, the account concludes: "This gulf is so extensive and the inhabitants so numerous, that it appears like another world."

The chapter concludes here, and the author leaves the subject; but it is easy to understand how the geographers of 250 years later, searching the text of the good Messer Marco for verification of new discoveries in and rumors about this borderland betwixt East and West, might be attracted by so alluring an opening, and so ignore the inference, plain enough to modern eyes, that the description fitted a region much farther to the south.

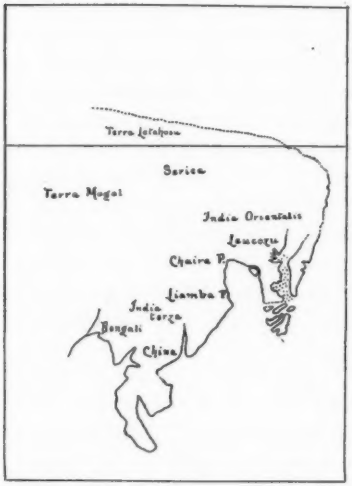

FIG. 5—Outline sketch map of part of Eastern Asia according to Homem.

Be this as it may, it is certain that, having once appeared, the name Ania, or Anian, was destined to haunt the maps of the Northern Pacific, and persist upon the "backside of America" for over 200 years. The conception of a dividing strait was for a while extremely vague, and the more conservative geographers were content merely to carry the coast lines both of Asia and the New World so far as their definite information extended, leaving the closing of the gap to the future. This conservatism is exhibited, for instance, in the beautifully executed portolano of *circa* 1540,[3] of which a facsimile is in the library of the American Geographical Society, and also in the map of John Rotz in 1542.[4] The idea of a close approach but definite separation of the continents was nevertheless slowly gaining credence, and so we find that Tramezini in 1554[5] and Ho-

[3] British Museum. Egerton MS. 2854. No. 4. (See Fig. 3.)
[4] British Museum. Royal MSS. 20. E. IX.
[5] British Museum. Atlas of the World, Kings maps. 4. 1. 60. (See Fig. 4.)

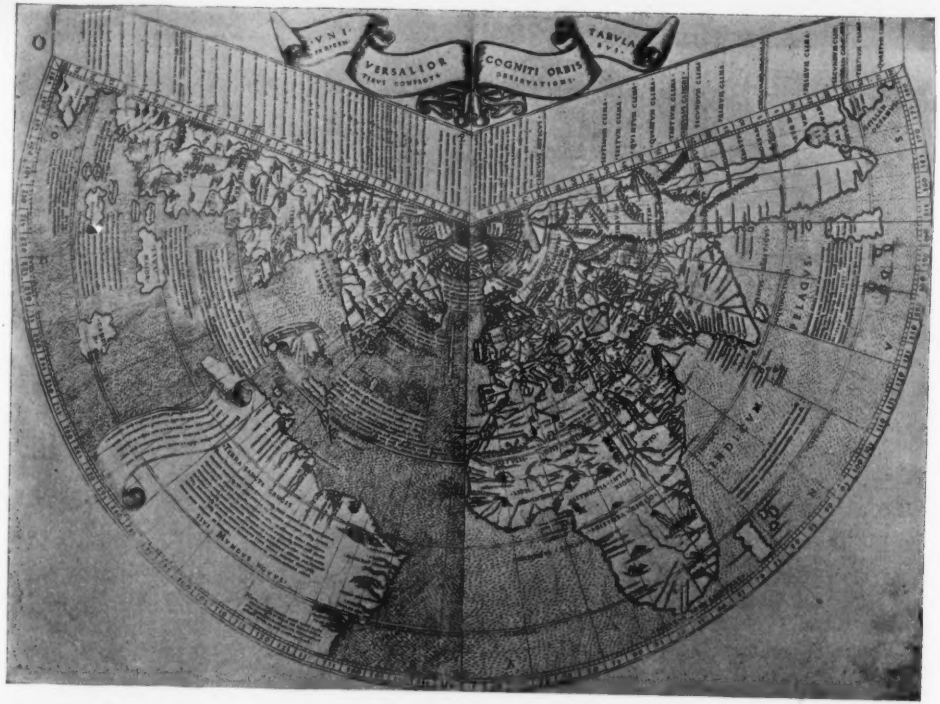

FIG. 1—Ruysch's map of 1507, showing supposed relation of newly discovered lands to the Asian continent.

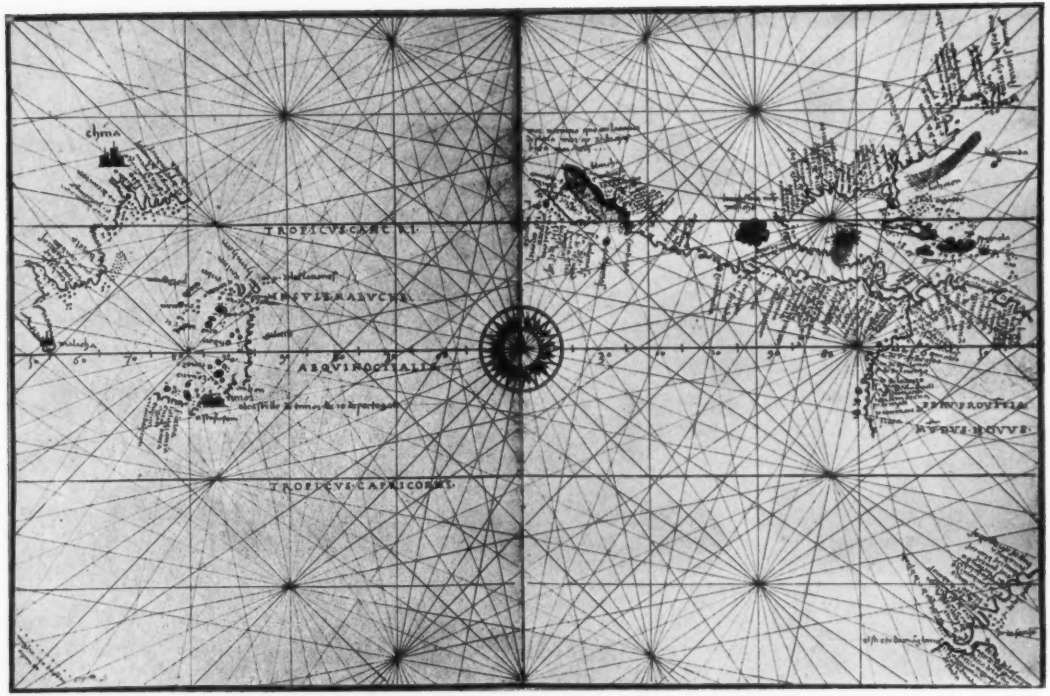

FIG. 3—Portolano of Northern Pacific, *circa* 1540.

mem in 1558[6] both drew definite but apparently still hypothetical coast lines, bordering the great opening. In Homem's map, too, there is to be found what was perhaps the nucleus of the idea of a double strait between the Pacific and Northern Oceans, with a great intervening island or body of land, for he carries the great gulf above the sea of Leucozu to an indefinite but apparently widening opening towards the north. Parts of Homem's beautiful maps were much copied, oftentimes almost in facsimile, by other cartographers during the next century or so.

Giacomo di Gastaldi, the Venetian cosmographer, has left two maps having a bearing upon the subject of the Asia-American connection. The earlier of these is a map of the world, dated 1550, which shows a continuous body of land uniting the two continents, the Pacific Ocean terminating in latitude 40° in a great gulf which he names the Gulf of Tonza[7] (Fig. 6).

In the second map, which is of Eastern Asia and dated 1561, he shows the coast of China extending up to and apparently unfinished at latitude 50° N., at which point the map terminates (Fig. 7). These two maps plainly show that hereabouts lay the period of transition between the ideas of a definite joining or a possible separation of the two continents.

It is in this 1561 map of Gastaldi's that the name "Ania" first definitely occurs, being applied to a province in the extreme northern part of the map. Winsor, Bancroft and other historians have traced the earliest use of the name Anian to Zaltieri's map of 1566,[8] and this may be so as far as its application to a strait is concerned, but I think there can be little doubt that Zaltieri's strait of Anian, Gastaldi's province of Ania, and also the province of Anian in the Martinez map of 1562, all signify the same thing—the Ania of Marco Polo. This is the more certain since the province of Kinsai or Quinsai or port of Zaitun are features of all three.

Once placed upon the maps, the Straits of Anian became a well-known feature, and for a while served only in their original capacity of dividing Asia from the New World.

Mercator differed from most of his contemporaries in placing the kingdom of Anian upon the American side of the strait, this doubtless being his interpretation of Polo's text, in which the countries of Ania, etc., are only "approached." Maps and map-makers were

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[6] British Museum. Add. MSS. 5415. (See Fig. 5.)

[7] Tonza is the spelling adopted in the Italian epitome of Marco Polo's travels for the Province of Koncha. Chapter 72. Book 2.

[8] British Museum. Maps 70. d. 1. (See Fig. 8.)

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plentiful during the latter part of the sixteenth century, but all geographers were in fair accord regarding the existence of a strait and the general configuration of the coast of Eastern Asia. Upon the American shore of the Pacific matters had not advanced so far. The coast was still practically unknown, and access to it was jealously guarded by the Spaniards. The idea of a short cut to China was now beginning to engage the minds of merchants, mariners and map-makers, and so it seemed possible that the Straits of Anian might prove to be the gateway for such a passage into the South Sea, and that the solution of the mystery might lie somewhere along this unknown coast.

Determined attempts were made, therefore, by other nations to break into the Spanish preserves. The Portuguese made at least one attempt to explore in the Eastern Pacific in spite of the treaty of demarcation; and the voyage of Sir Francis Drake undoubtedly had for one of its main but unattained objects the discovery of a northwest passage. This was in 1578-1579, and the Spanish answer to Drake lay in the voyages of Sebastian Viscaino, which likewise proved abortive as far as knowledge of the strait was concerned.

They had doubtless made other attempts toward the same end, for Hakluyt records a letter written in 1572 by a certain Henry Hawkes, an English merchant who had made a five years' sojourn in Mexico, which reads as follows: "There is another port-town which is called Culiacan on the South Sea, which lieth west and by north out of Mexico, and is 200 leagues from the same; and there the Spanyards made two ships to goe seeke the streight or gulfe, which as they say is between the Newfoundland and Greenland; and they call it the Englishmen's streight: which as yet was never fully found. They say that the streight lieth not farre from the main land of China, which the Spanyards account to be marvellous rich."[9] Rumors regarding this still undiscovered route to the Indies became more frequent during the early part of the seventeenth century.

Purchas in his "Pilgrimes" (1625) gives an affidavit made by Thomas Cowles, a mariner, to the effect that he had seen and read an account in the year 1573, published in Lisbon, of a voyage made from the Pacific to the Atlantic by way of the north of America, by one Martin Chacke in 1567. This affidavit is signed 1579.

Purchas is also authority for the account of the reputed voyage

[9] Hakluyt. Voyages and discoveries. Macleose reprint. Vol. 14, p. 381.

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of Juan de Fuca into, but not through, the northwest passage. The tale was told by Juan de Fuca to one Michael Lok, and was briefly as follows: He set out prior to 1592 in quest of the Straits of Anian, with three small ships. A mutiny took place and the expedition was abandoned, but was afterward reorganized under the leadership of Fuca alone, with one small caravel and a pinnace. He found an opening in Lat. 47° with a well-marked entrance, "having on the northwest coast thereof a great hedland or iland with an exceeding high Pinacle or spired rocke, like a pillar, thereupon." In twenty-seven days' sailing within this vast strait or opening he had reached the vicinity of Hudson Bay.

The upshot of the tale lay in the fact that Fuca wanted to be outfitted and reimbursed for a certain meeting "off Cape California" with the English captain Cavendish, whereby he had lost 60,000 ducats. Upon this being done he was ready to "rediscover" the strait and turn the knowledge so gained over to England. Lok tried to raise the necessary funds, but failed to do so, and so it was left for other adventurers to carry on the quest. In the year 1643 the Dutch, under the leadership of De Vries, worked to the northward from Japan and discovered a passage which they believed to lie between Asia and a great mid-oceanic body of land which they called Jesso, and to this strait the name of its discoverer, De Vries, was commonly given by the Flemish school of cartographers; and so the Straits of Anian were now in a measure forced over from the position which they had originally been supposed to occupy and placed either between this land of Jesso and the American continent, or else definitely penetrating the latter, as reported by Fuca and others.

This added uncertainty lasted for many years in the minds of some geographers, for we find in the "Great Historical Dictionary" of Jeremy Collier, revised in 1688, the following entry: "Anian; a famous streight which the Spaniards call Estrecho d'Anian, between the Island of California and Terra de Jesso; it's thought to lie north of China and Japan and to separate Asia from America, but of this there is no certainty."

The more definite locating of the Straits of Anian upon the American side of the Pacific, and the added probability that they did indeed constitute a link in the desired route to China, involved them still more in that web of romance which was woven about the voyages, real or imaginary, of the searchers after such a route; and so most wayfarers from the far side of the world had something to

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add to the tale. Some of these accounts did not appear until long afterwards, when the struggle for supremacy and priority of discovery in North America between England and France was at its height. Among other reputed voyages from ocean to ocean was one said to have been made in 1598 from the Atlantic to the Pacific. The account of it was first given in 1790 by M. Buache, geographer to the King of France, in a paper read before the Academy of Science, and the substance of it is as follows: M. de Mendoza, a captain in the Spanish Navy, had been employed to search through various archives for the use of that service and had found the account of this voyage, which was reputed to have been made under the command of Lorenzo Ferrer de Maldonado. From an examination of this journal it had appeared that when this navigator had arrived in 60° N. and 325° E. (from Ferro) he steered to the westward, leaving Hudson Bay to the south and Baffin Bay to the north, and in 65° N. and 297° E. he had altered his course to the northward, sailing through what he called the Straits of Labrador, until he found himself in 76° N. and 278° E. in the frozen ocean. He then held his course southwest and "passed through the strait which separates Asia from America." In 60° N. and 235° E. he entered the South Sea, naming the strait through which he passed "Anian," but which M. Buache would have called "Ferrer's Straits," in memory of its discoverer.

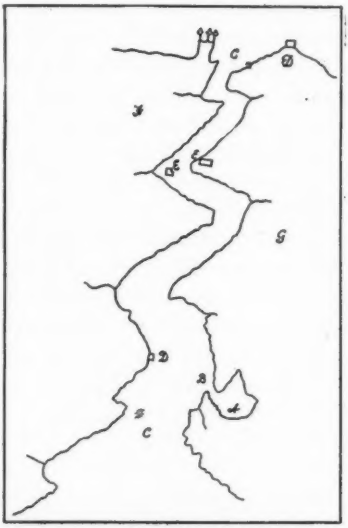

FIG. 9A—The Straits of Anian according to the account of Maldonado's voyage in MS. in the British Museum. Fig. 9A: Bird's-eye view of the straits.

It is needless to point out that M. Buache was misled as to the truth of this account, at least in so far as the original application of the name "Anian" by Ferrer in 1598 was concerned, since we have seen that Zaltieri had used it in his map of 1566. The weighty authority of M. Buache, however, caused this account to be given wide credence, and it was frequently quoted and referred to in con-

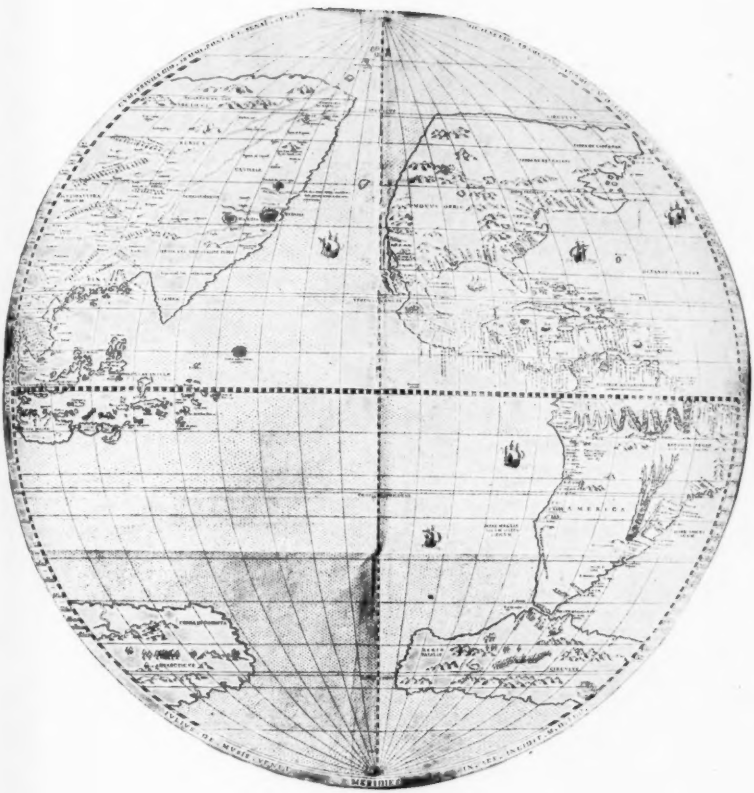

FIG. 4—Tramezini, 1554.

FIG. 6—Gastaldi's map of the world, 1550.

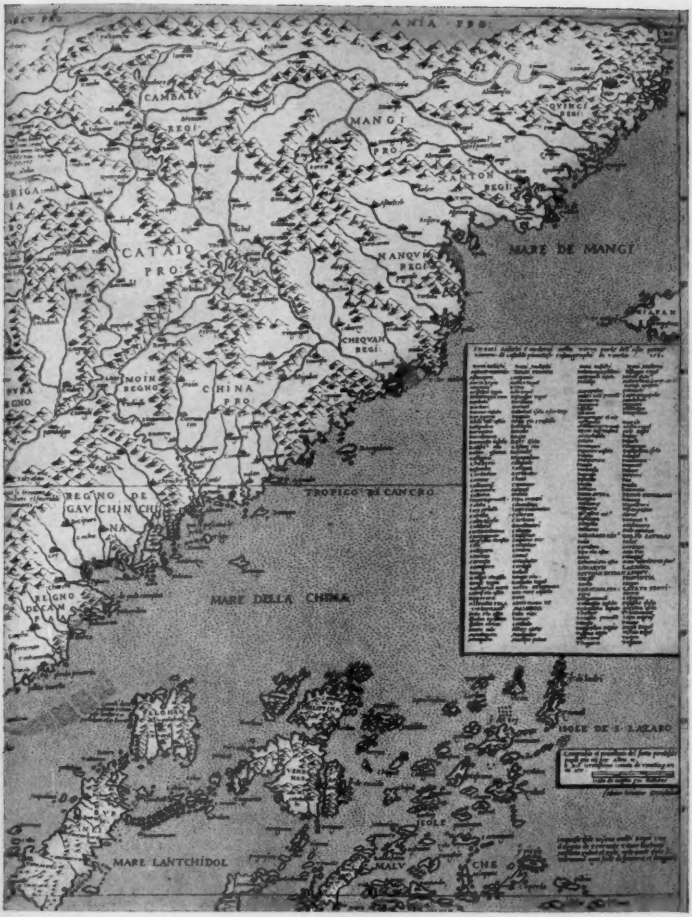

FIG. 7—Gastaldi's map of Eastern Asia, 1561.

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FIG. 8—Zaltieri's map of 1566, showing the Straits of Anian.

troversies over the Northwest Passage, and Anian became more firmly established than ever as the name of the missing strait.

There exists in the MS. department of the British Museum a most interesting document which purports to be a certified copy of this same original account of Ferrer's voyage. The caption states

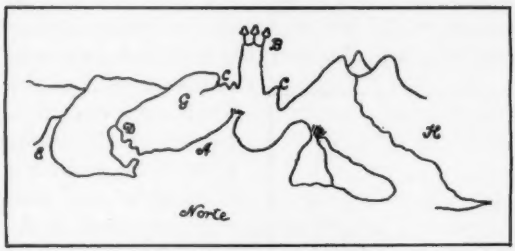

FIG. 9B—View of north entrance.

that it was copied in March, 1781, at the instance of Don Juan Bantista Munoz from the original in the Infantado Library in Madrid. There is a discrepancy of ten years between the date of the voyage in this account (it is here 1588) and that in M. Buache's memoir, but the two clearly refer to the same affair. The chief interest in this copy lies in the fact that it is embellished by a bird's-eye view and two profiles of the entrance to the strait, which are apparently covered by the same affidavit of accuracy upon the part of the copyist as the rest of the manuscript.

FIG. 9C—View of south entrance.

The leading mark for the northern entrance is a certain high pinnacle of rock with three trees upon the top of it. A safe harbor capable of holding fifty ships, streams of fresh water, and country where game may be obtained are all ready to hand, and the discoverer has very thoughtfully marked the channel with beacons for the benefit of future voyagers.

One Martin d'Aguilar is supposed to have found the entrance to a strait in 42° N. in 1603. The record of this voyage is to be found in various maps of Dutch cartographers.

FIG. 8—Zaltieri's map of 1566, showing the Straits of Anian.

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An account of a voyage, which for minuteness of detail ranks with that of Maldonado, is the often-quoted one of Admiral de Font from the Pacific to the Atlantic in 1640. The journal containing the account of it was published in 1708, and various attempts were made during the early part of the eighteenth century to rediscover this route. Then, too, a certain Thomas Peche is said to have sailed 120 leagues within the Straits of Anian in 1676, intending to return to England that way; but the season being far advanced and the winds continuing contrary, he was obliged to give up the attempt and return by Cape Horn in 1677.

FIG. 10—The Straits of Anian according to Font.

As these and other voyages were reported and discussed from time to time, the supposed entrance to the straits was moved up and down the coast by various geographers, but it at length settled down to a position in about latitude 40° to 50° N., just to the northward of the Island of California.

Some few authorities revived an old idea, first promulgated by Jodocus Hondius in 1611, that there existed a further opening from the head of the Gulf of California, beyond the limits of Alarcon's and Ulloa's explorations, and this was looked upon as the entrance to the straits. The more general opinion was, however, that California was an island and that the upper end of the Mar Vermejo united with the Pacific about its northern end to form a great but indefinite opening into the mainland. This was the theory of Sanson, Moll and other well-known cartographers whose maps were widely copied and accepted as authoritative.

Others supposed that a great and approximately circular opening existed at about this same latitude, and to this the name "West Sea" was frequently given. It was looked upon merely as an inland sea, although it was supposed by some to communicate by

various straits, lakes and waterways with Hudson Bay. Jacob Colorn placed the entrance to the Straits of Anian between the Island of California and the coast of New Albion, which lay to the north of it. Ogilby, in 1671, placed the entrance far to the north, in lat. 56°.

Dampier, in his account of his voyage of 1688, advised seekers after the northwest strait to go into the South Sea and begin the search from that end by carefully examining the coast for an opening and sailing therein until they gained the Atlantic. His own maps, however, do not show the northern part of California, and so he leaves his own conception as to the position of the strait in doubt.

It was not until 1730 or thereabouts that confidence as to the existence of Anian began to waver, although Father Kino's explorations seemed to have definitely settled the question of the insularity of California in 1702. Some there were who still perpetuated the theory of Hondius, referred to above, and imagined that the entrance to the straits might yet be found opening from the head of the Gulf; and this spark was doubtless fanned from time to time by reports as to the deep basins to the northwest and the fickle and ever-changing channels of the Colorado across its delta. That such data did come to map-makers during the eighteenth century is plainly shown by various otherwise unexplainable details in different maps of this period. This continued uncertainty as to the head of the Gulf of California probably did much toward keeping alive the Anian myth.

Captain Anson, of the British Navy, made his memorable privateering voyage round the world in the years 1738-44, and took from the Spanish galleon which he captured in the Pacific a chart of the western American coast, which became commonly accepted as authoritative among English sailors. This chart is reproduced in John Knox's "Collection of Voyages," published in London in 1767, and shows an almost straight coastline, unbroken save for the entrance to the Gulf of California. This chart, indeed, gave much the same configuration to the northwest coast of America as did Robert Dudley in his "Arcano del Mare" of 1661.

Efforts were made by both English and French navigators between the years 1740 and 1750 to solve the mystery of the Northwest Passage, but, in spite of the prominence given at this time to the supposed voyages of Font and others, the opinion was now becoming general that the Pacific entrance must lie very far to the

north and not involve the Straits of Anian at all. Even as late as 1775, or thereabouts, some of the more conservative geographers still made references to the tradition. Thus Burke, in his geography of 1770, gave a map showing "the supposed Straits of Anian" entering the land in about lat. 45°. The "American Atlas," published in London in 1776, harks back to the original conception and shows "The Straits of Anian of the Ancient Geographers" in the position which had been usurped by the Strait of De Vries.

From this time onward the search for the Northwest Passage became a matter of Polar exploration; the name of Bering was given to the only inter-continental opening which was found to exist, and Anian at length faded from the maps. It will be seen, however, that the name, after having been borrowed in the first place from Marco Polo, was used at different periods in three distinct, although associated, scenes: first, as the name of an opening between the two continents; second, as a definite link in the greatly desired short cut to Cathay, and, third, as the name of a vague and nebulous opening into the North American continent, placed and arranged to suit the fancy of inventive sailors or the conjecture of ingenious cartographers.

It was a strangely persistent myth, though, and of especial interest to the student of western development, inasmuch as its attempted solution was the aim and object of much that is best worth recording among the tales of human endeavor and adventure upon the "hindside of the world."

GLACIAL SCENERY IN ALASKA

By LAWRENCE MARTIN

The glaciers of Alaska are a great scenic asset of the Territory. Gannett's estimate of this scenery is not overdrawn.

"There is one other asset of the Territory not yet enumerated, imponderable, and difficult to appraise, yet one of the chief assets of Alaska, if not the greatest. This is the scenery. There are glaciers, mountains, and fiords elsewhere, but nowhere else on earth is there such abundance and magnificence of mountain, fiord, and glacier scenery. For thousands of miles the coast is a continuous panorama. For the one Yosemite of California, Alaska has hundreds. The mountains and glaciers of the Cascade Range are duplicated and a thousand-fold exceeded in Alaska. The Alaska coast

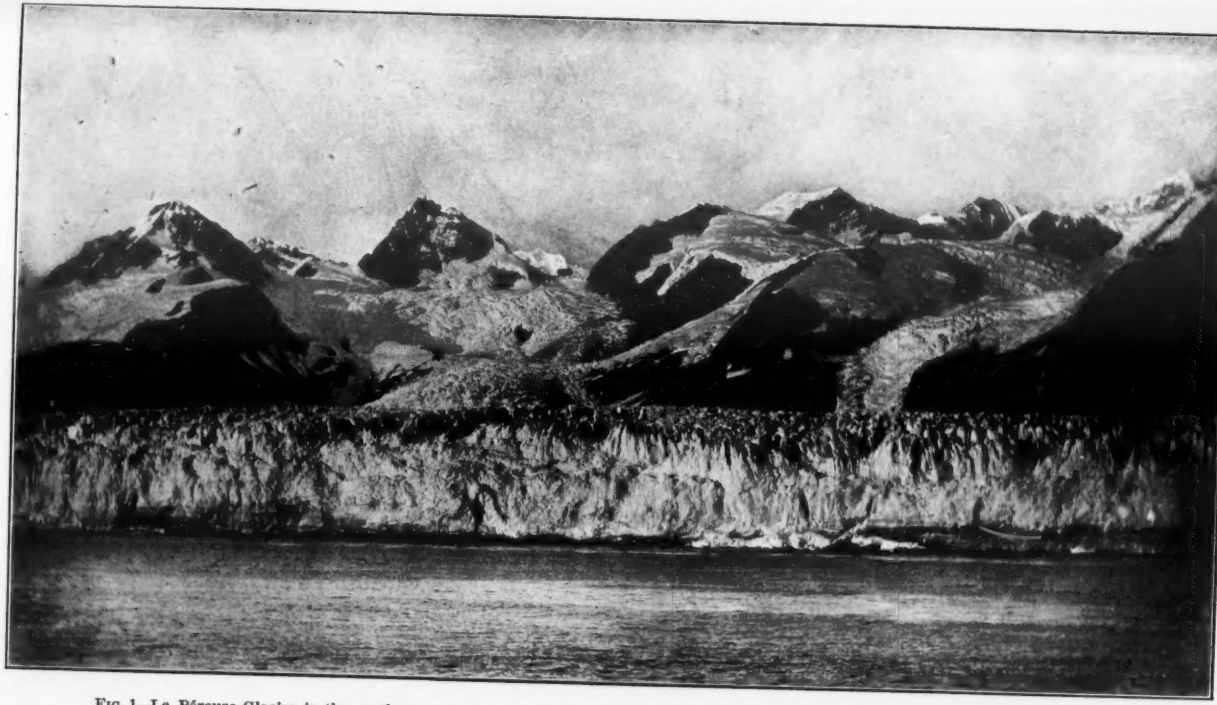

FIG. 1—La Pérouse Glacier, in the southern part of the St. Elias Alps. Named by Dr. W. H. Dall after the French explorer La Pérouse.

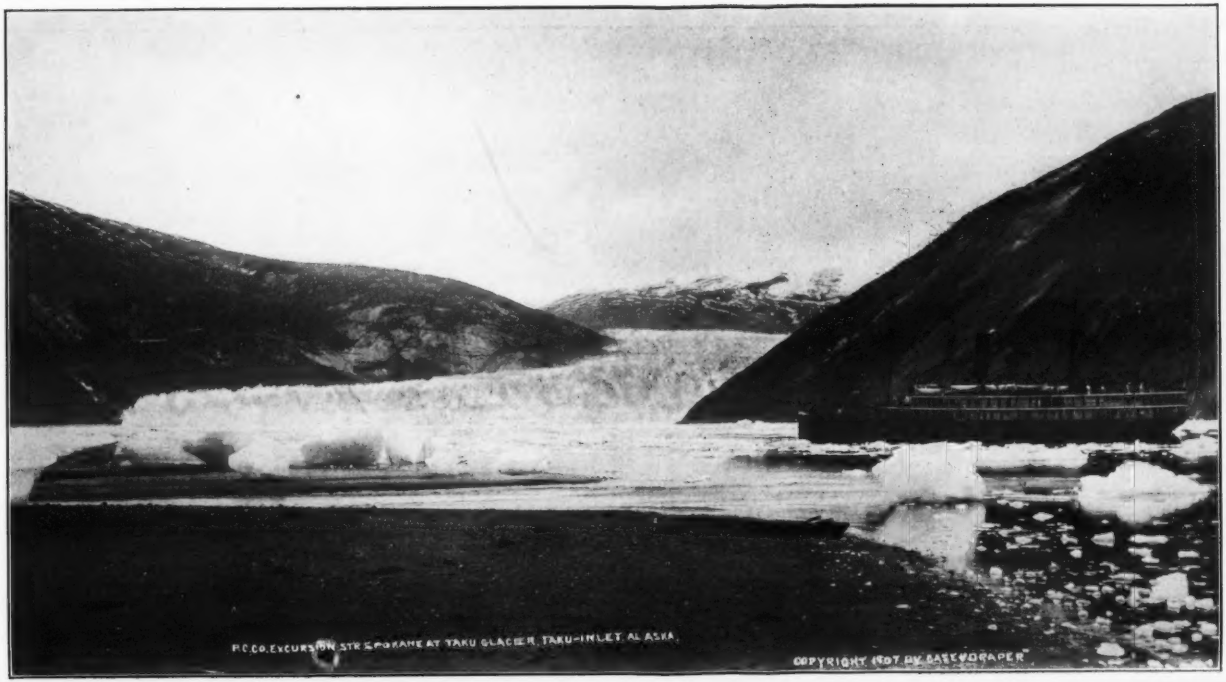

FIG. 2—Taku Glacier, southeastern Alaska.

is to become the show-place of the earth, and pilgrims, not only from the United States, but from far beyond the seas, will throng in endless procession to see it. Its grandeur is more valuable than the gold or the fish or the timber, for it will never be exhausted. This value, measured by direct returns in money received from tourists, will be enormous; measured by health and pleasure it will be incalculable.

"There is one word of advice and caution to be given those intending to visit Alaska for pleasure, for sight-seeing. If you are old, go by all means; but if you are young, wait. The scenery of Alaska is much grander than anything else of the kind in the world, and it is not well to dull one's capacity for enjoyment by seeing the finest first."[1]

The traveler upon Alaskan steamships may see several of the ice tongues from the steamer decks, including the Sumdum Glacier, visible from Frederick Sound a short distance north of Wrangell Narrows, and the Mendenhall, Eagle, Herbert, Davidson, and other glaciers, seen from Lynn Canal between Juneau and Skagway. A beautiful view of La Pérouse (Fig. 1), Grand Plateau, Yakutat, and other glaciers of the Fairweather Range may be had from the Pacific Ocean between Cross Sound and Yakutat. On a clear day the Malaspina and its tributary glaciers and the Bering Glacier are a wonderful sight from the ocean between Yakutat and Prince William Sound. There are few more imposing sights in the world than ice-mantled Mount St. Elias and Mount Fairweather. Valdez and Shoup Glaciers are usually to be seen from the decks of the steamers. Those ascending Stikine River have a good view of the glaciers there from the steamboat.

Thousands of tourists upon the excursion boats have had excellent views of Taku Glacier (Fig. 2) and the other ice tongues of Taku Inlet, and formerly of Muir Glacier, as seen from boats entering Glacier Bay. Here many tourists have landed and walked upon Muir and Taku Glaciers. Excursionists have also gone occasionally to Columbia and Brady Glaciers. Many of the other tidal glaciers are readily accessible, though few have been visited frequently. The Yakutat Bay glaciers are especially worthy of notice, but are not now accessible to the tourist. Over 3,000 tourists were carried to Taku Glacier in one season by two of the four steamship lines whose boats visit this fiord.

In one case it is possible to see a glacier at close range by auto-

[1] Henry Gannett: Harriman Alaska Expedition, Vol. 2, 1901, pp. 276-277; *Nat. Geogr. Mag.*, Vol. XII, 1901, p. 196.

Fig. 2—Taku Glacier, southeastern Alaska.

mobile travel. The industry of the citizens of Valdez has provided transportation from the docks and town over the outwash gravel plain to the very front of the Valdez Glacier.

Now that the railroad has been built up the Copper River valley, the great glaciers there have become readily accessible to travelers. One may travel by steamship from Seattle to Cordova and there take a train past the fronts of Scott and Sheridan Glaciers and up to the Miles Glacier, only forty-nine miles from the port. Here the railroad passes between Miles and Childs Glacier and farther on over the end of Allen Glacier, where the rails and ties are laid for five and one-half miles upon the ice. Farther north the Heney and Kennicott Glaciers are easily seen from the Copper River and Northwestern Railroad. On this route there are numerous minor glaciers, a wonderful river and canyon, and mountain scenery not inferior to that in the Canadian Rockies and the Swiss Alps. The region is destined to rank with the Grand Canyon of the Colorado, the Yellowstone Park, and Niagara Falls as an American wonder-spot, readily accessible to those who wish to visit it. The glaciers on the Alaska Northern Railroad are also easily accessible to travelers on that line.

Alaskan glaciers possibly show more geographical relationships than those of any other region. They have been more generally visited than those in Greenland, Iceland, Spitzbergen, New Zealand, Patagonia, the Himalayas, the Caucasus, etc., but not so much as those in the Canadian Rockies, Norway, and the Swiss Alps. They surpass the glaciers of each of the latter regions in size and setting—perhaps, on the whole, in beauty, and certainly in grandeur. They have even more of the direct and indirect relationships to life than those in Canada, Switzerland, or Norway, but they have no villages, good roads, comfortable hotels, guides, etc., at the glaciers themselves. They have no great centers of population near at hand to supply visitors. Nevertheless thousands of tourists have seen the more accessible Alaskan glaciers; and with the improvement of steamship and railroad service there is no doubt that the future will see an enormously increased utilization of this great American scenic asset, the glaciers of Alaska.

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GEOGRAPHIC ASPECTS OF THE WAR

By DOUGLAS WILSON JOHNSON
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Introduction. Every military campaign is controlled to some extent by the surface features of the country over which the contending armies must move. Both detailed movements of troops and general plans of campaign must be ordered with due regard to topography; and the geographer who reads the war dispatches with a good assortment of large-scale topographic maps before him will perceive many evidences of the rôle played by land forms in military operations.

It need hardly be explained that while the best maps show the topography with a high degree of accuracy, the official reports of troop positions are always very generalized and often purposely incorrect. Despite this limitation, the careful student can learn enough to justify a study of the war from the physiographic standpoint. The object of the present article is to present a picture of the surface upon which the western campaign has been conducted and to note incidentally some relations between topography and military movements.

I.—THE WESTERN THEATRE OF WAR

The geologic architecture of western Europe is the key to its salient topographic features. A broad area of folded and broken rocks was bevelled across by erosion, and upon the flat plain thus formed horizontal layers of clay, sandstone, chalk, and limestone were deposited. The whole mass was then warped upward around the edges so as to produce a gigantic saucer or basin, known to geographers as the "Paris Basin." From those parts of the basin's margin which were bent upward to the greatest heights erosion has removed the covering rock layers and exposed the underlying folded beds, which have in their turn been carved into mountain ridges and valleys. Among the marginal areas of upilfted and dissected older rocks are the Vosges Mountains on the east and the Ardennes on the north.

As the most important activities in the present war have thus far occurred in the northeastern portion of the basin just described, we may give our further attention exclusively to this area. The accompanying illustration shows a rectangular block of the earth's crust, which we may imagine as cut out and isolated for greater convenience of study. It represents the northeastern quadrant of the Paris Basin and some adjacent territory. Without making any pretension to accuracy, the diagram will serve to emphasize those elements of surface form essential to an understanding of the campaign against France and Belgium.

One readily observes, for example, that south of Paris the layers of sandstone and other stratified rocks are nearly horizontal, but that they slope upward very gently to the west and east to form the rims of the basin. It will be seen, also, that the underlying folded rocks come to the surface at the east, forming mountains from which the later beds have been completely eroded. Originally this eastern rim of the basin was a broad north-south arch, with a gently rounded summit; but a north-south block of rock extending along the crest, and

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bounded by two parallel fractures, dropped down several thousand feet, giving the broad, flat-floored valley of the middle Rhine. The fertile plains of this valley floor constitute that part of the province of Alsace which the French are most anxious to recover from the Germans.

The two remaining limbs of the former arch, facing inward toward the down-dropped central strip, are known as the Vosges Mountains and the Black Forest. Each of these ranges has a gentle back slope away from the valley, and a steep face toward the valley representing the nearly vertical fracture surface now eroded into sharp crested ridges and narrow ravines. Both slopes of each range are sufficiently rugged to make agriculture difficult and the building of roads and railroads expensive; hence the ranges are but little developed, and much forested land remains. But it is on the steeper slopes which lead abruptly downward to the flat floor of the Rhine Valley that the ridges are most rugged

FIG. 2—Schlucht Pass across the crest of the Vosges Mountains, showing contrast between the gorges on steep eastern face (foreground), and the more open country of the gentle western slope (background).

and the forest most unbroken. Here the movement of large bodies of troops is particularly difficult, especially if they must ascend the slopes in the face of a determined enemy.

It was not political expediency alone which led the French to invade southern Alsace at the beginning of the war. The international boundary line follows the crest of the southern Vosges, and it was much easier for the French to move up the gentle west slope of the Vosges, capture the passes and then sweep down the steep eastern face upon the flat plains about Mülhausen than it was for them to cross the boundary farther northwest, where no such advantage was furnished by the topography. A French soldier, writing home from the battle line in the Vosges, described the influence of topography upon the fighting in that district

FIG. 1—Block diagram showing topographic features of

atures of west-central Europe.

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in the following words: "Our task has been much easier in the southern Vosges than farther north. In the south it is all downhill after we cross the border; but in the north we must fight uphill against the Germans after we have entered their territory, as there the boundary line lies west of the mountain crest."

It is stated in press reports that a commander of German forces at Mülhausen, ordered to lead his men across the Vosges Mountains into France, made three futile attempts to carry the heights of the range in the face of French artillery. Then came an urgent message from the Kaiser: "The crest of the Vosges must be crossed at any cost." A fourth desperate assault by the intrepid commander ended in his defeat. Retiring to his quarters, the unhappy general committed suicide, first sending to his Kaiser this message: "The Vosges cannot be crossed. Come and try it yourself." I cannot vouch for the truth of this report; but it serves to illustrate the peculiar surface features of the Vosges which render their ascent comparatively easy from the French side of the border but very difficult from the German side.

In this connection it is interesting to note that should the French succeed in pushing the Germans back to the east side of the Rhine, their further eastward advance in southern Germany would then be opposed by precisely the same topographic difficulties which have long retarded the westward movement of the Germans in southern Alsace. The Black Forest will replace the Vosges in immediate importance, and while the Germans hold the crest and more gentle eastward slope of this range the French will find assaults against the steep west-facing scarp both costly and difficult.

Not far south of Mülhausen, but beyond the limits of the drawing, the Vosges Mountains descend to a low pass which connects the Rhine Valley with the valley of the Soane in eastern France. In this pass, guarding the strategic gateway from one valley to the other, stands the mighty fortress of Belfort, the southernmost of the great fortifications erected against a German invasion. Entrance to France by this route is easy, so far as the natural physical features alone are concerned; and in the commercial intercourse between the two nations the gateway has played an important rôle. But the opening is narrow enough to be effectively defended by the fortress in its center and to permit the concentration of troops in such numbers as to render its passage by an invader extremely difficult. Whether the fortress which withstood the attacks of the Germans in 1870 can defy the guns which reduced Liège, Namur, Maubeuge and Antwerp will be determined only in case the Germans can push the French field army back far enough to bring the Krupp guns within range of the walls of Belfort.

North and west of the Vosges Mountains the older series of folded rocks, exposed at the surface around the margin of the Paris Basin, have not been raised so high as in the Vosges. Instead they form an upland of but moderate elevation, which was once a nearly level erosion plane; but which, since the uplift, has been cut into hills and valleys by many branching streams. This hilly country is known as the Slate Mountains, the Haardt, the Eifel, and by other names in Germany, and as the Ardennes in southern Belgium. Although usually described as mountainous, the most striking feature of this area is the remarkably even sky-line which appears in every distant landscape view, and which is proof that the much folded rocks were once worn down to a surface of faint relief, after which warping raised the surface to its present position and permitted its dissection by river erosion. The upland is now so

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badly cut up by streams that cross-country travel is difficult, and transportation lines tend to follow the valleys.

Two main rivers cut across this upland toward the northeast—the Moselle and the Meuse; while the lower Rhine transects it from southeast to northwest. Evidently two armies with headquarters at Coblenz and Cologne, and supplied by the railways, auto roads and steamer routes which pass through the Rhine Gorge, could attack France simultaneously if one ascended the Moselle to Luxemburg and the other passed from Cologne westward around the north side of the hilly country to the Meuse and then followed southward up that valley. Hence it was that in the early weeks of the war we heard much of the "army of the Moselle" and the "army of the Meuse"; and the capture of Liège, Huy, Namur, Dinant and Givet marked the progress of the latter army

FIG. 3—Distant view of Dinant, Belgium, showing the even sky-line of the Ardennes upland. The river is the Meuse, whose valley forms one of the two routes by which the Germans crossed through the upland to France.

along the best pathway through the Ardennes. The forts guarding the towns just named were located on projecting spurs of the upland, whence they overlooked the closely crowded houses on the narrow valley floor below, or on portions of the upland farther back from the river. Photographs of the fort at Dinant have become familiar to most Americans from their frequent appearance in the pictorial supplements of newspapers and in magazines. The vertical cliffs crowned by solid walls of masonry suggest an inaccessible mountain peak and seem well-nigh impregnable. But such pictures are taken from the valley side of the fort; it must not be forgotten that from a different viewpoint the fort would be seen to rest upon the edge of a fairly level upland and to be more accessible from the upland surface, even though that surface is somewhat dissected by smaller stream courses.

Now, let us return to the inner part of the Basin, where the horizontal stratified rocks still cover the older and complexly folded beds. The rock layers of the stratified series are of unequal hardness, and it will be observed from the diagram that wherever a resistant layer comes to the surface it forms a line of cliffs, while the intervening weaker layers have been eroded into broad valley lowlands. If the basin structure were perfect, the upwarped edges of each resistant layer would form a circular line of cliffs extending all the way around Paris. As it is, the rudely circular arrangement of the cliffs is very noticeable, although they are not everywhere developed.

It will be seen that the cliffs face outward, away from the center of the basin, while from their crests the upland surfaces slope gently inward, toward Paris. It is these uplands which are referred to as "plateaus" in the newspaper despatches. They differ from typical plateaus in having one steep slope and one gentle slope, and are known to geographers as "cuestas." Because the steeper side of the cuesta is always away from Paris, an enemy approaching that city from the east would have to ascend the escarpments under the fire of the defenders' guns, whereas the army of defense could manœuvre its troops to advantage on the upland above, or retire down the gentle back slope while a small rear guard delayed the ascent of a victorious invader. During the Battle of the Marne the German center near Sézanne is said to have been subjected to a disastrous fire from French artillery posted along the crest of the first line of cliffs east of Paris, a position which effectively commanded the open plains of the broad lowland of Chalons just east of the escarpment. For months a German army operating against Verdun from the lowland of the Woevre district has tried in vain to ascend the line of cliffs east of that important fortified city; and at the time these lines are written they have only succeeded in gaining a precarious foothold further south, where the escarpment is partly broken down by more effective erosion. According to the best available information, the Verdun forts have not been active in repelling the German attacks; but the French field army, aided by the topographic advantage, has held the Germans out of range of the forts.

The only instances in which a cuesta is bordered by cliffs on the side toward Paris occur where a river has eroded a valley in the upland, west of the main cliff-face and parallel to it. Examples of this are found at Verdun where the Meuse River flows through the back slope of a cuesta, and west of Verdun where the upper Aisne River has a similar course. The west-facing cliffs are merely the eastern walls of the river valleys; and it will be seen that the Forêt d'Argonne, where stiff fighting has occurred both in this and in other wars, is a long and comparatively inaccessible tableland formed by that part of a cuesta lying east of the valley of the upper Aisne.

It is true that some rivers cut across the cuestas from one lowland to another, giving a limited number of easy routes through the lines of cliffs. But the openings are neither wide enough nor numerous enough to offset the protective effect of the east-facing escarpments. Furthermore, these passes are easily guarded by fortifications, the individual forts being located both in the valleys and in commanding positions on the adjacent uplands. Thus, at La Fère, Laon, Rheims, and Soissons, which guard the openings through the inner line of cliffs to the Oise River Valley and Paris, the projecting spurs of the upland are crowned by forts whose guns frown down upon each valley gateway from various points of the compass. A large proportion of the places whose

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FIG. 4.—Level plain of northern Belgium. Over this remarkably flat surface the Germans moved great armies with almost incredible rapidity. The black smoke in the distance is from the town of Audegen set on fire by Belgian shells.

names filled the news columns during the German advance on Paris and the retreat to the Aisne are strategic points because they guard important openings through the cuesta escarpments. In addition to the four named above, one might mention Épernay Sézanne, Rethel, Vitry-le-François, Nancy, Toul, pinal and Metz, not to mention others which have figured less prominently in the press reports.

The gap at Toul is not now occupied by any river; but the upper Moselle formerly flowed through this opening into the Meuse River, until it was diverted to its present course. The abandoned valley through the cliffs is of such strategic importance that it is protected by one of the strongest fortifications in France. At Sézanne is another gap abandoned by the stream which carved it; but in this case the capture of the former river by one of its neighbors occurred so long ago that the gap had not been cut to any considerable depth or width; hence this route, although used by an important railway, is not of such great strategic value. A third gap carved by a river which has since been diverted to a new course is found just north of Sézanne; and the St. Gond Marsh, where German artillery became mired during the retreat which followed the successful French attack upon the German center between Sézanne and Vitry, is caused by stagnant water occupying the abandoned valley of the diverted stream.

Toward the northwest the successive lines of cliffs decrease in height and finally disappear. Further north the plain of Holland and northern Belgium, formed in part by the delta deposits of the Rhine and other rivers, reaches the sea at an altitude so low that only dykes prevent its marginal areas from being submerged at high tide. The Belgians have repeatedly taken advantage of this topographic feature, as when they retarded the siege of Antwerp by opening the dykes and flooding the country adjacent to the city, and during the Battle of the Yser, when they flooded the lower part of the Yser Valley and forced a German retreat. Even where the plain is not low enough to be submerged it is remarkably free from topographic inequalities of any magnitude. The river valleys are shallow, and the valley walls slope very gently upward to the level surface of the plain. Good roads and railways are numerous, and the forests have been largely removed in order to devote the fertile land to agriculture. The plain is not only admirably adapted to the rapid movement of great masses of troops, but is productive enough to sustain large armies for a long period. It is a part of the vast lowland extending from southwestern France to northeastern Russia, over which one may travel the entire distance by rail without passing through a single tunnel and without rising 600 feet above the level of the sea. Its remarkably flat surface is the most striking characteristic of landscape views of central and western Belgium.

It is interesting to consider Germany's breach of Belgian neutrality in the light of the topography as described above. A glance at the accompanying diagram will show that four principal routes of invasion were open to her. She could concentrate her forces in the southern part of the broad valley of the middle Rhine and thence ascend the steep eastern face of the Vosges Mountains or pass around their northern end across the dissected upland of Lorraine, or around their southern end through the narrow gateway guarded by the fortifications of Belfort. If these obstructions were successfully passed, the invading armies would then have to scale in succession one line of east-facing cliffs after another, under the fire of artillery directed against them from every projecting spur of the escarpment and from the head of every ravine cut back in

its face. To perfect their lines of communication, the fortresses protecting the openings through the cliffs would have to be levelled as the troops advanced. The engineering problems involved in supplying a large army and in moving heavy siege guns would be far more serious in a country broken by such

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FIG 5—The first line of east-facing escarpments, east of Paris, near Ay. From the summit of these vineyard-covered slopes French artillery dominated the lowland of the Champagne district, during part of the Battle of the Marne.

escarpments than on a level plain where new transportation routes are readily constructed at will. Germany could scarcely hope to make a dashing attack on Paris by this southern route, even were the fortifications here no more

formidable than those farther north. The topography alone would enable the French to render the advance of an invader slow and costly.

An advance up the Moselle by way of Metz would obviate the necessity of crossing the escarpment of the Vosges; and if the army turned southwest through Luxemburg it would avoid still more of the topographic difficulties of eastern France. But, as appears from the diagram, most of the cuesta escarpments would still have to be crossed on the way to Paris, and this route is open to the same objections, although to a lesser degree, as the more southern one.

The two remaining routes lie through Belgium. The one up the Meuse through the Ardennes involves the destruction or masking of the forts on the uplands overlooking the valley at Namur and other points; but once in French territory the cuestas could be crossed where they are dying out toward the northwest, and the march on Paris could be made over a country much easier to traverse than that farther east. Less direct, but still more favorable for the movement of armies, is the route across the level plains farther north in Belgium, by way of Louvain, Brussels and Mons into the slightly dissected plain of northern France near Cambrai and St. Quentin. Here an army could avoid every important topographic obstacle until the broad valley of the Seine was reached. Even if the taking of La Fère and Laon were necessary, these fortifications mark the innermost cliff line next to Paris and are located where that escarpment is dying out toward the northwest to disappear entirely.

It is highly significant that the main invasion of France was by the most roundabout but topographically most favorable route. The distance from the nearest point on the Franco-German boundary, near Metz, to Paris is about 170 miles as the aeroplane flies. From the German-Belgian border to Paris via the Belgian plain the distance is approximately 250 miles. Germany therefore selected a route which was nearly 50 per cent. longer than that directly from her own territory into France. The longer route involved the violation of Belgian neutrality, and to follow it would very probably bring into the conflict the Belgian army, and possibly the army and navy of Great Britain. Surely the choice of an invasion through Belgium must have been dictated by very compelling reasons to justify it in the minds of the German general staff. The official statement that the crossing of Belgian territory was "a matter of life and death" to Germany was literally true. An advance from the Franco-German boundary across the cuestas of the Paris Basin would undoubtedly have required the sacrifice of an added number of German lives, and would have made impossible the contemplated rapid dash to Paris.

Germany was compelled to choose between keeping her international pledges at the expense of crossing unfavorable topography and breaking those pledges in order to profit by a more favorable route. She chose the latter course. Without touching on the ethical questions involved, we may note that for political reasons the violation of Belgian neutrality has undoubtedly proved more costly than would have been the crossing of the escarpments of northeastern France.

(*Other parts will follow.*)

TERRESTRIAL TEMPERATURE AND SOLAR CHANGES

By ELLSWORTH HUNTINGTON

During the past summer there have appeared two articles which are likely to play an important part in future investigations of the causes of climatic variations. Each is the summation of a long series of earlier studies. In one of the articles,[1] Köppen, with the aid of a large series of tabulations by J. Mielke, investigates the relation of changes in mean temperature to changes in the sun-spot cycle during the entire century from 1811 to 1910. This includes nine sun-spot cycles. The final conclusions are based upon averages derived from about 20,000,000 observations of temperature in all parts of the world. In the earlier years, only about 30,000 per year are available, but, toward the end, the number rises to 500,000. It will be practically impossible to extend the basis any wider for some years to come. All the available early materials seem to have been drawn upon. During later years it would be possible to utilize an even larger number of stations than has actually been done, but this would not influence the results, since the additional stations would be located near those already employed. The only great improvement upon Köppen's present work would be the inclusion of a much larger number of marine stations and of stations in remote regions not yet controlled by civilized man. That will not be possible for many years, so that the results now before us may be regarded as settling the question as far as any settlement is yet possible.

The other paper, by Arctowski,[2] employs a wholly different method. Instead of trying to utilize as many observations as possible, he has taken a smaller number and has investigated them intensively. His method is almost diametrically opposed to that of Köppen. Little attention is paid to averages, but very great attention is given to small variations from month to month and from place to place. Arctowski's method consists primarily of two things. In the first place, he eliminates the effect of the seasons by averaging first the twelve months from January to December of a given year, next the twelve from February of the same year to January of the succeeding year, then March to February, and so on. In each case he uses the average for twelve consecutive months and plots it in the middle of those months. Thus he gets curves showing the amount by which, in any given region, the temperature for each month departs from the normal for the period of ten years which he has undertaken to investigate. In addition to this he has plotted the monthly departures upon maps, and thus, for each month of the ten years, he has a map which shows just what parts of the country were above or below the normal temperature for that particular season. His method is in the highest degree intensive and geographic, while that of Köppen is extensive and mathematical. Since a

[1] W. Köppen: Lufttemperaturen, Sonnenflecken und Vulkanausbrüche, *Meteorologische Zeitschrift*, Vol. 31, 1914, pp. 305-328.

[2] Henryk Arctowski: A Study of the Changes in the Distribution of the Temperature in Europe and North America during the years 1900 to 1909, *Annals of the New York Academy of Sciences*, Vol. 24, 1914, pp. 39-113.

period of only ten years is covered in Arctowski's present article, and of only ten more in previous articles where the data have been dealt with less fully, Arctowski's work does not attempt to deal with the eleven-year sun-spot cycle, but only with variations of shorter periods. Hence in every respect it differs from that of Köppen. Yet both authors agree in their final conclusion.

They conclude that changes in the sun cause changes in the distribution of temperature upon the earth. Since the available data are derived from only a small part of the earth's surface—that is, from the inhabited lands, especially in Eurasia and North America, and to a less extent in the other continents and islands—they do not assert that the mean temperature of the earth as a whole

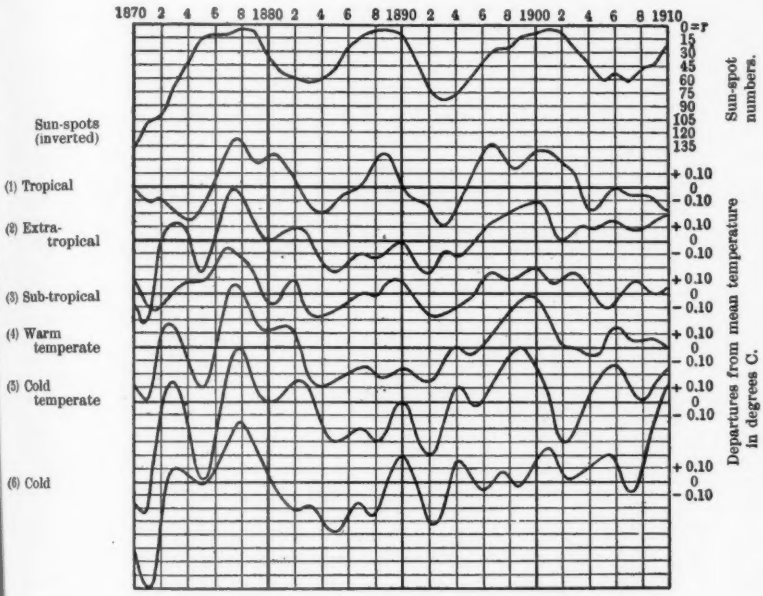

FIG. 1—Sun-spots and temperature, 1870 to 1910. After Köppen.

varies from one part of a cycle to another, but they both appear to believe that this is probably the case.

Köppen divides the world into twenty-five regions, which he again groups into (1) tropical and (2) extra-tropical. The latter includes the following zones: (3) subtropical, (4) warm temperate, (5) cold temperate and (6) cold. In his Figure 2, reproduced here as Figure 1, he plots the figures for these zones for 40 years below the *inverted* sun-spot curve. A little examination shows that the tropical curve agrees closely with the sun-spot curve, and the same is true of the subtropical curve, except that 1872 and 1873 are exceptional years, while the maximum of 1888-9 is delayed. Coming to the temperate zones the agreement is still visible but less marked, while in the cold zone

there is agreement up to about 1877 and after 1906, but disagreement in the intervening period. This means that the following law seems to hold good: when sun-spots are numerous the temperature of tropical regions is lower than the normal, while as the number of spots decreases the temperature rises until it reaches its greatest excess above the normal at times when spots are least numerous. Outside the torrid zone this intimate relation between spots and temperature becomes less and less apparent, until it almost disappears in the far north. Köppen further finds that the greater the number of stations

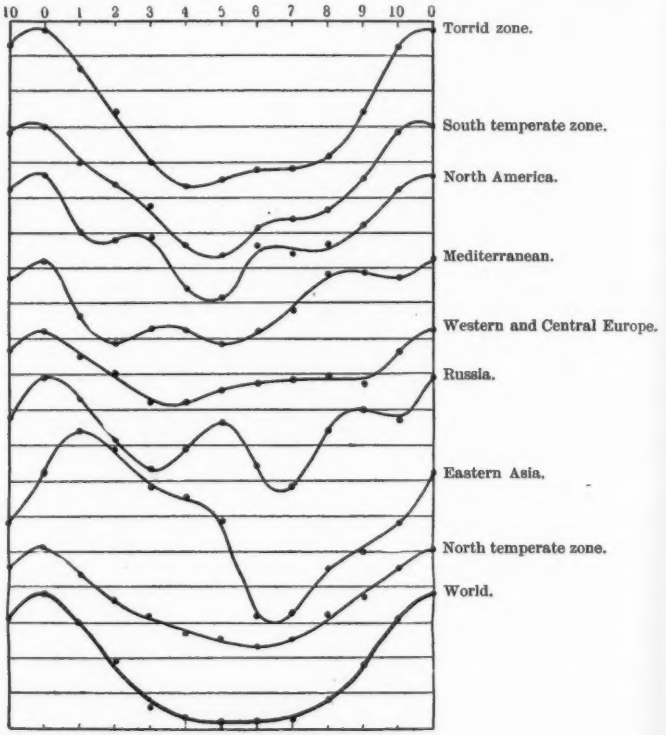

FIG. 2—Variations in temperature during the sun-spot cycle.

and the larger the number of years, the closer becomes the agreement. When he made his first investigations over forty years ago the temperature appeared to lag behind the spots, but with fuller data this lag almost disappears. The results for the entire period of one hundred years have been divided into a number of divisions, for which the smoothed curves shown in Figure 2 (Köppen's Figure 3) have been plotted. The unsmoothed figures for the upper two curves and the lower two curves are given in the accompanying table. In the figure the year "0" is equivalent to the "approximate year of sun-spot minimum" in the table.

DEPARTURES FROM MEAN TEMPERATURE DURING THE SUN-SPOT CYCLE*

YEAR OF SUN-SPOT CYCLE	TORRID ZONE	SOUTH TEMPERATE ZONE	NORTH TEMPERATE ZONE	WORLD (LANDS)
Approximate year of sun-spot minimum....	0.36° C.	0.23° C.	0.31° C.	0.32° C.
1 year after minimum	0.11	0.08	−0.04	0.11
2 years after minimum.....	0.07	0.03	0.07	0.07
3 years after minimum.....	−0.11	0.03	−0.07	−0.08
4 years after minimum.....	−0.23	−0.20	−0.06	−0.13
5 years after minimum (=approximate year of sun-spot maximum).....	−0.11	−0.20	−0.12	−0.14
6 years after minimum.....	−0.13	−0.03	−0.08	−0.11
7 years after minimum.....	−0.11	−0.08	−0.20	−0.16
8 years after minimum.....	−0.13	−0.04	0.07	−0.04
9 years after minimum.....	0.02	0.00	−0.04	−0.02
10 years after minimum.....	0.24	0.25	0.07	0.18

* Köppen does not use the exact sun-spot cycles, because their length varies. He employs a uniform period of slightly over 11 years. Hence the minima do not all fall in the first year of our table, but may fall a year or even two years earlier or later. This makes no difference in the general result, however, for if the actual years of sun-spot maxima and minima are used instead of Köppen's approximations, we find that the difference in temperature amounts to 0.44°C, instead of 0.46°C., as it now stands in the last column of the table.

The results obtained by Köppen are so consistent in various parts of the world, and agree so well with those obtained by other investigators, such as Newcomb, that it no longer seems possible to question the truth of the general law enunciated above. This at once brings up a most interesting question. To quote from Abbott (*Science*, Vol. 39, 1914, p. 347): "It appears that the greater the number of sun-spots the higher will be the solar constant of radiation, and that an increase of a hundred sun-spots corresponds to an increase of about 0.07 calories per square centimeter in the solar radiation outside the earth's atmosphere." In other words, when sun-spots are especially numerous the sun's radiation increases in intensity, and the earth grows *cooler*. In a paper entitled "The Solar Hypothesis of Climatic Changes" in the *Bulletin of the Geological Society of America*[3], I have suggested that this striking anomaly may be due to an increase in convection at times of many sun-spots. Tropical hurricanes and the cyclonic storms of temperate regions both become more numerous at such times, and they may possibly carry so much warm air upward in the convectional movements of their centers that they appreciably lower the mean temperature of the earth's surface in the torrid and temperate zones, but not appreciably in the polar zones, where the centers of such convectional storms are rarely found. Increased activity of the sun may be the cause of the increased activity upon the earth. In this way, when sun-spots are numerous, the earth's surface may become cooler, the air near the present upper limit of convection may become warmer, and the level of the isothermal layer may be raised. The matter is too complicated for further consideration at this time.

When one sun-spot cycle is compared with another Köppen does not find reason to think that the mean temperature varies in harmony with the range of spottedness. That is, when the difference between the maximum and minimum spots of a given cycle is great, there does not seem to be a correspondingly great difference in the mean temperature. In support of this he gives

[3] Vol. 25, 1914, pp. 477-590.

the following table, which I have rearranged so as to place the sun-spot cycles in the order of their intensity:

First Year of Sun-spot Cycle	Difference between Maximum and Minimum Sun-spot Numbers	Difference between Temperature at times of Maximum and Minimum Spots		
		A North Temperate Zone	B Tropical Zone	C South Temperate Zone
1833	126	2.2	5.1	...
1867	126	−0.1	1.7	2.9
1844	115	0.5	1.5	2.2
1855	88	2.8	1.2	2.0
1889	80	0.6	2.4	1.7
1822	61	1.4	2.4	...
1878	59	1.8	2.1	1.3
*1811	45	3.2	...	...

* The data here are too scanty to be of much importance.

In the north temperate and tropical zones the table supports Köppen's conclusion, but in the south temperate zone the range of temperature decreases regularly in harmony with the decrease in range of spottedness. The north temperate and tropical zones contain large masses of land, and the figures for temperature represent the conditions as influenced by the varying intensity of winds from the ocean. The south temperate zone contains so little land that it may be regarded as representing marine conditions. If similar conditions are characteristic of the ocean as a whole—except in the parts where large bodies of heated water are brought in from other latitudes—the mean temperature of the entire earth must rise and fall in harmony with the sun-spots, not only when parts of the same sun-spot cycle are compared, but when different cycles are compared.

The last part of Köppen's paper is devoted to a discussion of the effect of volcanoes upon temperature. He comes to the conclusion that no important effect seems as yet to be proved. He bases this chiefly on the fact that if volcanic dust is a main factor in causing a reduction of temperature, years showing a large minus departure of temperature ought to be more numerous than years showing a large plus departure. The contrary is the case.

Arctowski's chief result has to do with his so-called pleions and anti-pleions. These, as readers of the *Bulletin* will remember, are the two phases of cycles of about two to four years in length during which the temperature of such places as Arequipa, which is taken as the standard, ranges from about half a degree Fahrenheit above normal during a pleion to half a degree below during an anti-pleion. In his new work Arctowski shows that these pleions are found consistently in large portions of the world, but in some cases they are synchronous with those of Arequipa, elsewhere they lag behind, and in still other places they are reversed. The agreement between widely remote places is so unmistakable that it seems hard to doubt the author's conclusion that we are here dealing with a phenomenon which is due to some non-terrestrial source which acts upon all parts of the earth. The sun is the only known body which could so act. The effect, however, is not the same in all places. For example, suppose that the sun's radiation increases for a few months during the summer of the northern hemisphere. The south polar regions will scarcely be

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influenced. The oceanic regions directly along the Tropic of Cancer will be heated to an unusual degree, and so will the great continental interiors of North America and Eurasia. On the oceans the heating of different regions in the same latitude will be comparatively uniform, and the excess of heat will be carried away by currents of wind and air in such fashion that the regions to leeward will receive their maximum amount of heat later than the Tropic, although the general character of the wave will be the same. On a continent, because of the great variety of topography and the unequal distribution of cloudiness and other conditions, some particular portion will receive a maximum addition of heat. That region will form the center of one of Arctowski's pleions.

From such a center, for reasons which are not yet understood, the pleion moves to other portions of the continent. It swings around in various directions. In one case the maps show that it started in the south Atlantic states, swung north into Canada, westward nearly to the Pacific coast and south toward upper California. Then it turned around and came back by nearly the same path, and finally swung west into Texas. A pleion may grow in intensity, or may decrease and die out. Several may exist upon a continent at the same time, according to the local circumstances and the season, which determine what places shall be especially heated. At some times a pleionian area, that is an area of temperature higher than the normal, extends all over a continent, or stretches from America across to Europe.

The essential point in Arctowski's researches is this: he has shown that our variations of weather from year to year are not accidental. They follow well-defined laws, and it is only a matter of time, patience and money to trace out the laws and determine in what direction an area of excessive temperature or of high pressure, or of unusual precipitation is likely to move. It ought ultimately to be possible to predict the course of such movements just as the movements of storms are predicted. In addition to this, Arctowski's work seems to show that in the little pleionian cycle, unlike the sun-spot cycle, there appears to be a direct response to variations in the solar radiation. In order to harmonize the conflicting evidence of the large and small cycles it seems necessary to suppose that the sun exerts two distinct kinds of influence. In the first place, changes in its constant of radiation produce the effect that we should normally expect, except that the effects are localized according to the seasons and according to topographic peculiarities. Hence they do not influence all places alike, but are especially prominent in some places and then are propagated outward in the form of irregular waves. Presumably the same thing happens in both the eleven-year and the shorter cycles. It has not been detected in the larger cycle, however, which may be because its effects are neutralized by the other type of solar influence, or because the matter has not yet been studied by Arctowski's geographic method. In the second place, as suggested above, the sun-spots may be connected with some other kind of influence, such as changes in the amount of air carried up in the centers of convectional storms, which may not only neutralize but actually reverse the effect of variations in radiation.

MR. ROOSEVELT'S BOOK ON AFRICAN GAME ANIMALS*

By CHARLES C. ADAMS

Those who are acquainted with Roosevelt's former writings on game animals and who also know of Heller's zoölogical writings will naturally expect valuable results from the present product of joint authorship. The authors claim that the main value of their work is that it treats of the subject "primarily as a suggestion of what is still open for discovery in this vast field of animal psychology and adjustment to environment." In other words, they hope to stimulate the study of the response of animals to their environments. Such studies would advance not only geography but also animal ecology.

The investigations upon which this treatise is based are mainly upon Roosevelt's eleven months' Smithsonian expedition, to which Heller added further field studies and extensive taxonomic studies in European and American museums. Such opportunities have never been equaled by previous authors.

The general chapters occupy about a fourth of the volume and cover the history of British East Africa, the origin of the fauna, both geographically and paleontologically, concealing and revealing coloration and their relation to natural selection, game preserves, equipment for hunting and collecting expeditions, and a bibliography of the game of East Equatorial Africa. The remainder of the two volumes, about 600 pages, is devoted to the detailed accounts of each kind of animal. Prevailing opinion derives the present African fauna from southern Europe and Asia, but this is because the European Miocene beds are well known, while those of Africa are little known. It is surprising that in a work of this character no reference is made to Lull's "The Evolution of the Elephant" (*Amer. Jour. Sci.*, Vol. 25, 1908, pp. 1-44, and the *Smithsonian Rept.* for 1908, pp. 641-675); or to Engell's work on the range and abundance of the elephant and lion in Africa (*Petermanns Mitteilungen, Ergänzungsheft, No. 171,* 1911).

The big-game fauna of British East Africa and Uganda is composed of three faunal areas. The chief source of this fauna has been the "South African region, to which three-fourths of the species are closely allied." The second element is allied to Somaliland or northeast Africa, while a small number of forest kinds have been derived from the Congo forests. The large carnivores and the elephants are generally distributed so that the faunal regions mapped have been based solely upon the hoofed mammals. In this discussion of the origin of the present fauna no effort is made to utilize the idea that formerly the climate of East Africa was more humid, a condition which would favor the Congo forest types and which may explain the presence of isolated colonies of such animals at favorable points within the arid region. (See *Bulletin,* Vol. 46, 1914, p. 133.)

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* Life-Histories of African Game Animals. By Theodore Roosevelt and Edmund Heller. Vol. 1: 420 pp. Vol. 2: pp. 421-798. Ills., index. C. Scribner's Sons, New York, 1914. $10. 10x7.

Within the faunal areas are life zones "based upon climatic and floral factors and quite independent of other barriers.... By using the zonal names in connection with the plant associations, we are enabled to define very precisely the habitats of the various animals inhabiting the region. The zones are primarily upon a floral basis, being founded upon the ranges of various trees and shrubs to which the distribution of a majority of the animals conform." Five of these zones are recognized and mapped. A bamboo grows at from 9,000 to 10,000 feet in an almost pure stand and is almost uninhabited by animals. It is refreshing to see the influence of vegetation so clearly recognized when it has been so often neglected by field naturalists. This relation is most clearly shown in a chapter devoted to the influence of the flora upon the fauna, in which they state that "plant associations are really the most important floral factors in the distribution of animals and are the most precise means of defining their range." Cocoa-palm characterizes the low tropical coast; the desert nyika extends far inland as a xerophytic thorn-bush steppe, between 500 and 3,000 feet altitude. Here the acacia, giant euphorbias, doum-palm and baobab are characteristic trees and the wait-a-bit bush (acacia) thrives. The high prairie veldt, between 3,200 and 9,000 feet, is grassland. The lower part of this zone contains acacia parks, grass with scattered brush and trees, while the upper part is dominated by grasses. The highland forest occupies the high plateau between 6,000 and 10,000 feet. By means of the fringe of forests along the streams, West African Congo forest animals have crossed the continental divide to the East Coast drainage.

These forests are composed of a great variety of trees, of rather limited range. The lower, middle and upper parts are very different. Strangely, the lower edge near the grasslands does not grade through a park-like stage into the forest but is massed and dense at its margin. At the timberline there is no dwarfing of the trees; the forest simply thins out and is bordered by a nearly pure stand of bamboo forest. Above the tree limit lie the Alpine moors, up to an elevation of from 10,000 to the snow at 14,500 feet. To follow this discussion of the vegetation a topographic map is needed, and a better map also than the one accompanying this work. Furthermore, it is confusing to use names in the text which are not given on or do not agree with the map. A fuller discussion of the climate and physical features of the region would have been of signal value. The discussion of the vegetation in general is static and not after the common standpoint of American ecological students, or that of Moore (The Tanganyika Problem, pp. 107-119. 1903).

The discussion of Thayer's views on coloration is judicious and temperate. The authors say of Thayer's book: "His elaboration of the importance of counter-shading in concealing objects under certain circumstances is very valuable indeed as a contribution to coloristic law. But his application of it as being the prime and well-nigh all-important factor in concealing coloration, produced through the 'omnipotence' of natural selection, is wholly untenable." As to concealing coloration, the general conclusion is drawn: "The first and most important point to remember is that, as regards the immense majority of birds and mammals, the prime factors in securing their safety are habit, if they do not trust to concealment, and habit and cover if they do trust to concealment." This chapter contains many valuable observations upon the behavior of animals in nature.

The chapter on game preserves is a brief account which concludes with the

following significant remark: "We sympathize with and admire the big-game hunter, but the time has passed when he can be taken very seriously if he is nothing but a big-game hunter. He ought to be in addition an out-of-doors naturalist, a faunal naturalist, or, at least, a trustworthy and interested observer and recorder of what he sees while in the wilderness" (pp. 159-160).

Practically three-fourths of the work is devoted to detailed accounts of the natural history of the different game species, beginning with the lion and closing with the elephant. The general method of treatment is indicated by the following topics: General account of a group or kind of animal, a rather full account of its behavior during chase, daily life and habits, variation in behavior at different times and in different conditions, and excellent illustrations and numerous distributional maps, which add much to the value of the book. The haunts are described fully, and very valuable accounts are given of the temperaments and emotions of animals, a phase which is frequently neglected by students of animal behavior because of their greater interest in the intelligence of animals. Supplementing the description of the animals are the keys for the determination of genera, species and races, and throughout this part the hand of a master taxonomist is in evidence.

On several occasions the authors emphasize the need of further study of the drinking habits, or rather lack of such habits, on the part of the animals in arid regions. Certainly there is a fine problem for a field naturalist. It is a problem, however, from which he will not secure the best returns unless he posts himself somewhat upon the physiology of water metabolism, such, for example, as he may find by Babcock (Metabolic Water: Its Production and Rôle in Vital Phenomena, *Univ. of Wis. Research Bull. No. 22*, 1912).

In brief, the work is a very valuable contribution both to geography and zoölogy, and no other book covers the same field. On account of their exceptional facilities and experience, the authors have given us a work which will long be standard in its field.

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THE EFFECT OF THE ERUPTION OF KATMAI ON LAND VEGETATION

By ROBERT F. GRIGGS
Ohio State University

During the summer of 1913, while the writer was attached[1] to the kelp expedition sent by the Bureau of Soils, United States Department of Agriculture, to southwestern Alaska, he spent several weeks in the region devastated in 1912 by the eruption of Mount Katmai. He had frequent opportunities for short trips ashore and was able to observe the effect on the vegetation at numerous points.

The general features of the eruption and its effects on the country and on vegetation during the first few months have been excellently described by Martin[2], and Captain Perry[3] of the revenue cutter *Manning* has given an account of the conditions prevailing during the eruption, while Rigg[4] has described the effects on marine vegetation.

Our first experience with the ash was at Seldovia and Chinitna Bay (Fig. 1), where the fall was less than an inch. Here the ash was light gray or almost white, and consisted of very finely divided fragments, which covered the clothes and irritated the throat. On the lower slopes of St. Augustine Volcano the deposit was somewhat thicker and looked like a thin fall of snow, giving the already barren and desolate landscape an indescribably weird appearance.

Throughout the region of heavier fall, however, most of the deposit consists of much larger particles, and the material is better described as "sand" than as "ash." When it first fell it became soft like quicksand after every rain and slid like liquid mud off the hillsides and down the valleys, burying everything in its track (Fig. 4). Martin says that traveling over the ash at that time was like crossing a field of molten tar. Now, however, it is well compacted like a surf-pounded sand beach and forms an almost ideal walking surface, being smooth, hard, and at the same time springy and resilient like rubber. In most places it is so compact that even hobnailed boots leave scarce a track behind them. There is no more tendency, however, for the particles to become cemented together than in the sand on the beach.

Mixed with the coarse sand particles is considerable very fine dust. Whenever the wind is strong, after some days of dry weather, this dust is carried into the air and forms a luminescent haze, which becomes thicker as the wind rises, resembling fog, and in heavy gales becomes a disagreeable dust storm.

While the ash no longer slumps off the hillsides *en masse*, the ordinary processes of erosion, of course, continue. Mr. M. D. Snodgrass of the Experiment Station told me that, on a hill near the experimental farm at Kalsin Bay,

[1] As scientist in kelp investigations.

[2] G. C. Martin: The Recent Eruption of Katmai Volcano in Alaska. *Nat. Geogr. Mag.*, Vol. 24, 1913, pp. 131–181.

[3] K. W. Perry: Volcanoes of Alaska. *Nat. Geogr. Mag.*, Vol. 23, 1912, pp. 824–831.

[4] Geo. B. Rigg: The Effects of the Katmai Eruption on Marine Vegetation. *Science*, N. S., Vol. 40, 1914, pp. 509–513.

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erosion had carried off all but two inches of the deposit on the steep upper slopes, while on the summit the original eleven inches remained undisturbed, and on the flat below the thickness was greatly increased by wash from above.

Character of Former Vegetation. The impression of a stranger arriving at Kodiak, which is typical of the devastated area, is that the eruption has had little effect on the vegetation. The landscape so much resembles an ordinary sand-plain, with its scattered coniferous trees and open sand spaces, that it is difficult to persuade one's self that it was not always so (Figs. 3 and 5). However much I read the raptures of Burroughs[5] over the pastoral scenes of "Green Kodiak," it was impossible for me to form any satisfactory mental

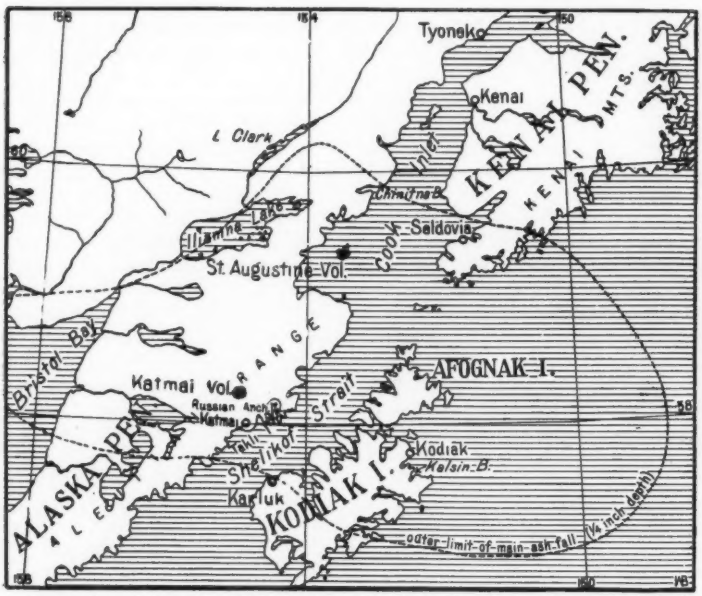

FIG. 1—Map of the region affected by the Katmai eruption, showing the outer limit of the main ash fall. Based on a map in the *National Geographic Magazine*, February, 1913. Scale, 1:5,800,000.

image of conditions before the eruption. The few photographs I was able to secure showing the vegetation before the eruption helped, but were inadequate. The difficulty is increased by the fact that the eruption covered the transitional zone between the coniferous forest and the grass-land of the Alaska peninsula. The vegetation on either side of the devastated area differs therefore from that which was destroyed. But from observations of the composition of the vegetation, both east and west of the ash-covered region, together with a study of the remnants of vegetation to be found around Kodiak, it was possible to get a fair idea of the character of the original plant covering.

Around Kodiak the country was partly an extension of the spruce forest of

[5] John Burroughs: Harriman Alaska Expedition. Vol. 1, p. 79.

the Sitkan region and partly open grass-land, with alder or willow and balsam poplar on the lowlands. In places where the spruces grew thickly the ground was occupied by the characteristic subordinate species of the Sitkan forest, including such plants as the devil's club*,[6] green hellebore* (Fig. 7), salmon berry,* ladyfern, beech-fern, and club-mosses. The numerous boggy or semi-boggy places were occupied by crowberry, mountain-cranberry, the northern bunchberry, an iris, the baked-apple berry, cotton-top grass, tall white bog orchis, the bog-cinquefoil, buckbean, marsh marigold, and bluebells, the last two reaching their best development only in swampy as contrasted with boggy places. The numerous ponds were full of the yellow flowers of the spatterdock* (Fig. 5).

In places where the spruces were more scattered the ground was occupied by breast-high blue-top grass with clumps of alder. Where conditions were favorable to blue-top it crowded out everything else and grew in pure stands. But where it was not so thick, low willows and a variety of herbaceous plants,

Photo by J. E. Thwaites.

FIG. 2—A blanket of volcanic ash among the spruces destroying the humbler plants. Ouzinkie, near Kodiak.

many of them with showy flowers, came in, forming a mixed meadow in which wild geranium (Fig. 7), fireweed,* painted cup, lupines (Fig. 6), cow parsnip,* bluebells, arctic star-flower, monkshood, and lady-fern were prominent.

Grass-land of this type is common on the less fertile lands to the westward (the richer are occupied by the red-top and alder).

Destruction of Vegetation around Kodiak. The effect of the fall of ash was to annihilate all of the humbler plants except such as were favored by some special circumstance. Nothing could be more striking than a comparison of such a grass-land as that just described, with the hillside photographed on Near Island opposite Kodiak (Fig. 8), which before the eruption was covered with similar vegetation. Aside from the willows which protrude through the deposit no plant of any kind appears.

The plants formerly occupying this habitat were not, however, poisoned or

[6] Plants observed as survivals in the thick undisturbed deposits at Kodiak are marked with an asterisk.

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FIG. 3—A gently sloping hillside on Near Island, Kodiak. Contrast with the effect on steeper slopes shown in Fig. 4. Looking across a cove at extreme low tide. The waves keep the rocks between the ordinary tides clean but the flats below are deeply covered, with the consequent destruction of the seaweeds that formerly occupied them.

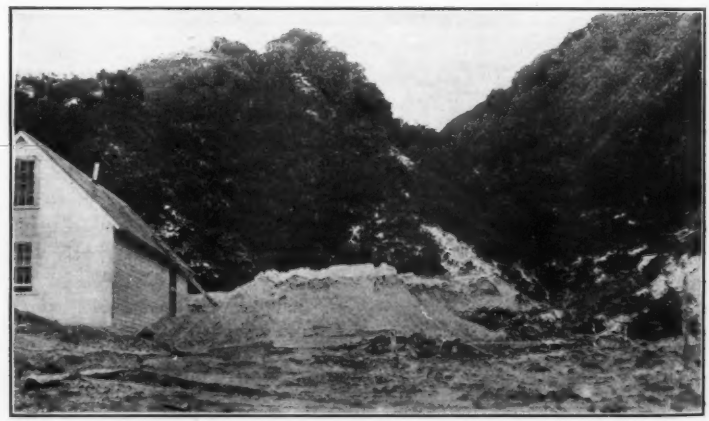

FIG. 4—Remnant of an "alluvial fan" washed out of a ravine. The ash came down as liquid mud and filled the houses full to the eaves. So much ash has slumped off the steepest hillsides that the vegetation (red top and alder) was comparatively little injured.

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Photo by J. E. Thwaites.

FIG. 5—An ash landscape near Kodiak. Pond filled up and spruces covered. The plants coming through are largely fireweeds.

FIG. 6—Lupines. These and other strong-stemmed plants came up through the ash with undiminished vigor.

otherwise injured beyond the merely mechanical effect of the deposit. They were simply buried so deeply that they were unable to send new shoots through the ashy covering. Wherever there were plants capable of piercing the ashy covering, these survived. Mr. Snodgrass told me that the fire-weed, *Chamaenerium angustifolium,* was the salvation of the sheep after the eruption. Its strong, vigorous shoots came up through the ash where the more delicate culms of the red-top were destroyed. For the same reason the beach-grass, *Elymus arenarius,* was but little affected by the ash, and has come up everywhere almost in its original luxuriance. Plants of all sorts came up through the mud cracks which formed when the wet ash dried out. Similarly, wherever the deposits slid off the hillsides so as to leave them bare or only thinly covered, the plants suffered comparatively little, and in the course of a few years will probably have recovered completely from the effects of the eruption (Fig. 4).

An interesting case of the survival of the fittest, under the new conditions, is the present abundance of the common horsetail, *Equisetum arvense,* which comes up freely through the ash where nothing else can. It displays the most curious reaction to the ash, also, in that oftentimes it does not grow straight up out of it, in its familiar switch-like form, but its main axis is suppressed at the surface and the lateral shoots spread out over the ground, forming tufts, or even mats, so that it looks like quite a different species. In places it forms a greensward of very attractive appearance. It is the abundance of such plants as this horsetail that gives the pseudo-natural appearance to the ash landscapes. One might easily believe that it was a natural sand-plain where horsetails had always flourished. According to Mr. Snodgrass, however, the horsetail was so scarce before the eruption that the natives did not know it and insisted until he dug down and showed them the old rootstocks beneath the deposit that it was a new plant which "had come with the ash," which is their explanation for everything unusual.

While great quantities of ash must have blown off and washed off the spruces, the lower branches of some of them are laden almost as heavily as ever (cf. Figs. 5 and 10). The weight of these deposits bent down the limbs, which were previously horizontal or slightly ascending. This effect is very striking when comparison is made between pictures of the same situation before and after the eruption. The boughs are, moreover, very slow in resuming their original position even when completely free of ash (cf. upper limbs in Fig. 10). The presence of such incrustations must have injured them by smothering the leaves, but I did not notice any indication of blighting or similar injury, such as Martin reported after the eruption of Iliamna and predicted in the present case. The only indication of poisoning or other injury, beyond the merely mechanical effects of the ash observed near Kodiak, was in the death of most of the conspicuous beard lichens which were hanging blackened and dead from their places in the trees.

Alders Killed by the Fumes. Nearer the volcano, however, there were numerous indications of other destructive agencies besides the ash fall. Our only landing on the mainland was at Russian Anchorage near Takli Bay. As we approached the harbor we observed that all of the alder, which is the only sizable bush in this region, appeared killed off on slopes exposed toward the volcano, while on the opposite slopes, which were somewhat protected, they were green and luxuriant.

FIG. 7—Geraniums, hellebores, ferns and willows in the mixed meadow characteristic of the Kodiak district before the eruption.

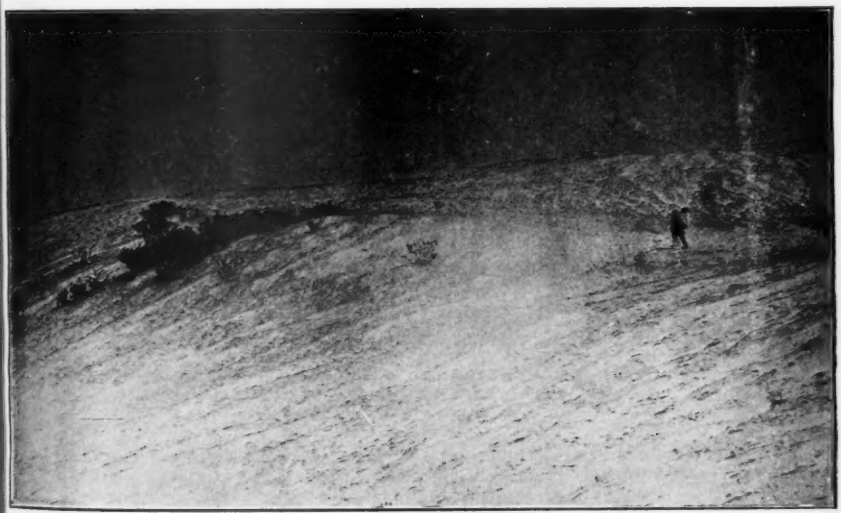

FIG. 8—A hillside where all vegetation except a few scrub willows was destroyed. Originally covered with a variety of herbaceous plants. Near Kodiak.

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On examining the blighted bushes more closely, however, we saw that many of them were sending up new shoots from the roots, while on others new twigs were being put out here and there, giving the plants a very peculiar appearance, which at once aroused inquiry as to its cause. When the twigs of plants even apparently quite dead were broken it was found that they were still flexible and the cambium was still green as in any twig during the winter. The *buds,* however, were all shriveled and dead. It was evident, therefore,

FIG. 9—Horsetails coming up in a gully where the general deposit was so deep that nothing could penetrate it. Russian Anchorage near Takli Bay on the mainland.

that the plants were not killed outright but were merely defoliated and their buds killed. Where here and there a bud escaped it grew out the following spring with undiminished vigor. One may suppose, of course, that these buds were killed by fumes or a hot blast from the volcano. This view receives apparent confirmation from the fact that such injury was confined to the exposed slopes in the station studied. It should be pointed out, however, that the erup-

tion occurred on June 6, when the leaves had just expanded and both they and the buds in their axils were in an extremely delicate condition and unable to resist unfavorable conditions. Their death, therefore, does not argue as much for the strength of the fumes as it would have done had the same effect been produced by an eruption two months later.

The alder leaves of 1913 were almost all in good condition, but numerous leaves of the elderberry and devil's club were blighted, as though from fumes of an eruption, the summer of that year.

In this station the deposit was evidently much thicker (36 inches, according to Martin's map) than at any other station visited. On the steepest slopes, where the ash had been washed off, the vegetation was coming up with undiminished vigor, as at Kodiak; but on the flats nothing was coming through

Fig. 10.—Ash clinging to the spruces after a year's rains. The upper branches, although completely free of ash, have not recovered their original horizontal positions.

except in the gullies cut partly through the deposit. In these we found a vigorous growth of horsetails just as at Kodiak (Fig. 5).

Prospects of Re-vegetation. The present vegetation of the devastated area is composed entirely of the remnants of the original vegetation, either woody plants, which stick up through the ash, or shoots from old roots, which have penetrated it from below. While these are perennial and will grow and spread for several years, it remains to be seen whether the ash offers a substratum in which seedlings of the next generation can gain a foothold and spread over unoccupied territory.

When the ash is thin enough to be penetrated by a subsoil plow, so that the original soil can be mixed with the new material, there is reason to expect an

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increase in the agricultural value of the land, which before had a superabundance of organic matter and in many places was mossy and sour. In places more deeply covered, where the ash only is turned over by the plow, the outcome is more doubtful.

Despite its light, sandy character, the physical condition of the ash resembles that of a first-class soil. It is, of course, necessarily poor in the salts required by plants, but the analyses show a small amount of phosphoric acid and an amount of water-soluble potassium equivalent to the figures given in the text-books on soils as the minimum requirement of plants. Although this might not appear to augur well for the vegetation, a comparison of such analyses with that of the ash of Krakatoa, which, according to Ernst[7], had no phosphoric acid and only a trace of soluble potash, is all in favor of Katmai. Yet in the course of twenty-five years Krakatoa was occupied by a new vegetation, in places approaching the original in luxuriance. At the time of our visit Mr. Snodgrass of the Experiment Station and Mr. Learn of the Kodiak Baptist Orphanage were very much concerned in the attempt to grow forage for their stock on the ash. Although they modified the natural conditions by the addition of nitrogenous fertilizers, the marked success which is reported to have rewarded their efforts holds much of interest to botanists as well as to agriculturalists.

In the case of Krakatoa, higher plants apparently did not succeed at the beginning. The first vegetation to appear was a layer of blue-green algæ, *Cyanophyceae*, which covered the surface of the ash and pumice and prepared the way for the development of ferns which, perhaps largely on account of their wind-borne spores, were the first vascular plants to appear, while the grasses and other seed plants came in later still. Climatic conditions in Alaska are, of course, so different from those surrounding Krakatoa that the process of re-vegetation must necessarily follow a different course. At the time of our visit there was no indication of such a development of blue-green algæ as occurred at Krakatoa.

The soil would appear rather to be especially suitable for plants of dry-sand barrens; but there were no such sand barrens in the devastated region before the eruption and no arenicolous plants except the halophytes on the beaches. There are, therefore, no plants on the ground especially adapted to the new conditions, and in view of the remoteness of the country and its very limited commercial relations with the outside world it is apparent that there is small chance of their importation. It will be interesting, therefore, to see which of the native species succeed in occupying the new habitat and to observe the stages in the renewal of the plant covering. One would expect that the remnants of the original vegetation sticking through the sand would become the centers of growth from which the new vegetation will be established. If this should occur, there would arise from these survivals (or a part of them) a new type of association different from any formerly present in the region—an open association lacking the various humbler guilds of plants which originally carpeted the ground. If such an association should be formed, it would be interesting to observe whether it is relatively permanent or merely a transitory stage in the rehabilitation of the old order of things; that is, whether the small humicolous species can come in on the ash or whether they must await the slow development of a layer of humus from the remains of other species which can

[7] A. Ernst: The New Flora of the Volcanic Island of Krakatau, p. 50. Cambridge, 1908.

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grow in the ash as it is. The very uniform development of bog, moor, and tundra (to which formations most of the exterminated species belong) over wide areas of diverse geological structure throughout this northern country would appear to indicate that these formations are favored by climatic influences, and if so it would appear safe to predict their early reappearance in the ash-covered country.

Summary. The primary effect of the eruption, except in the immediate vicinity of the volcano, where the vegetation was killed, can thus be largely summed up by the one word burial; and the effect on the vegetation was pretty much proportional to the depth of the deposit. More interesting from the botanical point of view, however, will be the secondary effects, which will become manifest only gradually through the years in the adjustment of the vegetation to the new conditions occasioned by the fundamental change in the character of the habitats occupied by species relatively but little affected by mere burial and the destruction of the smaller plants.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

Annual Meeting of the Society. The annual meeting was held at the Engineering Societies' Hall, No. 29 W. 39th Street, on Tuesday evening, Jan. 26, 1915, at 8.30 o'clock, Vice-President Greenough in the Chair. The following persons recommended by the Council were elected Fellows:

Miss Nellie B. Allen,	Frederick J. Breeze,
Pierre Arnold Bernard,	Douglas Wilson Johnson.

Professor Edward Hull, LL.D., F.R.S., of London, was elected a Corresponding Member. Professor Hull has long been one of the best-known geologists of Great Britain. He was formerly Professor of Geology in the Royal College of Science, retiring in 1890. He is now 86 years of age and has long confined his professional activities to service as a consulting geologist. He has written many papers and monographs on geology and physical geography; and in 1883-84 he conducted a scientific expedition to Arabia Petræa and Palestine, sent out by the Palestine Exploration Fund. He wrote a memoir on that work.

Report of the Council

The Annual Report of the Council was presented and read. It appeared in the *Bulletin* for February (pp. 123-124).

Report of the Treasurer for 1914

The Report of the Treasurer, Mr. Henry Parish, Jr., was read:

General Account for 1914

The Treasurer respectfully reports:

On January 1st, 1914, there was on hand a balance of (of which $1,000 was capital awaiting investment).		$2,560.91
During the year there have been received for Fellowship Dues, Sales of Publications, Interest on Investments, Donations	$37,956.58	
Contributions for special purposes	18,011.83	55,968.41
Total		$58,529.32
There have been expended for Salaries, Meetings, Purchases of books and maps, Library, Publications, House Expenses, Insurance, Postage, &c	56,496.89	
Investment of legacy received in 1913	1,000.00	57,496.89
Leaving a balance on hand Dec. 31, 1914 ($375 of which is capital awaiting investment).		$1,032.43

The reports of the Council and the Treasurer were approved and ordered on file.

Report of the Special Committee

The Report of the Special Committee charged with the duty of selecting candidates for the offices to be filled was presented and read:

New York, January 21, 1915.

The Special Committee appointed December 14, 1914, to nominate and invite suitable persons to fill the vacancies in the offices of the Society, existing

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at the date of its Annual Meeting in January, 1915, respectfully report that they recommend the election of the following gentlemen to the offices designated:

		TERM EXPIRING IN
Vice-Presidents	JAMES B. FORD	1916
	ANTON A. RAVEN	1918
Foreign Corresponding Secretary	PROF. WILLIAM LIBBEY	1918
Treasurer	HENRY PARISH, JR.	1916
Councillors	BANYER CLARKSON	1918
	CHANDLER ROBBINS	
	EDWIN SWIFT BALCH	
	EDMUND L. BAYLIES	
	WALTER B. JAMES, M.D.	

[SIGNED] PAUL TUCKERMAN,
HAMILTON FISH KEAN,
LEVI HOLBROOK,
Committee.

The vote of the Society was unanimously in favor of the persons recommended by the Council and they were declared duly elected.

Vice-President Greenough then introduced the speaker of the evening, Will S. Monroe, A.B., Professor of Psychology in the New Jersey State Normal School, who addressed the Society on "Bohemia." His very interesting and instructive lecture was illustrated by a large number of stereopticon views.

An extra inter-monthly meeting of the Society was held at the Engineering Societies' Hall on Tuesday evening, Feb. 9, 1915. Edgar James Banks, A.M., Ph.D., recently American Consul at Bagdad and Professor of History in Robert College, Constantinople, addressed the Society upon "Armenia," with lantern views.

The Society's Exhibitions. The number of visitors to the Exhibition Hall in January was 2,774. The collection of war maps, on which the explanatory symbols are changed daily to conform with the news from the front, continues to be a center of much interest.

On February 10 over 300 large photographs illustrating the scenery and the development of Alaska were placed on racks in the hall. The larger part of the collection and many maps of the territory, specially prepared by the Seattle Chamber of Commerce, have been loaned by that body for the exhibition. The admirable results of the work of the Agricultural Experiment Stations are finely illustrated by photographs loaned by the Department of Agriculture, Washington. Ex-Governor Brady and some of the railroad enterprises in Alaska have contributed notable series of views. The collection will be on exhibition for two months.

The large collection illustrating the progress of the Philippines under the American régime, which attracted many visitors to our hall for over two months, is now being shown to the people of Brooklyn by the Brooklyn Institute of Arts and Sciences.

NORTH AMERICA

The Kuskokwim River to be opened to Commerce. Secretary of Commerce Redfield announced on January 25 that a practical, navigable channel from Bering Sea into the mouth of the Kuskokwim River had been discovered by Captain Lukens of the Coast and Geodetic Survey. The Kuskokwim is the second largest river in Alaska. It is nine miles wide at its mouth and navigable for over 600 miles. The submerged flats of the delta extend 100 miles out to sea. It was through this uncharted delta that the survey steamer *Yukon* made the discovery of the channel which means much to the commerce of that section of Alaska. In making the survey Captain Lukens reports that he took 14,256 soundings, covering an area of over 100 square miles. When the Coast and Geodetic Survey chart showing the newly discovered channel is

issued it will be possible for steamship companies to send vessels to the Kuskokwim and thus initiate the development of the mining, fishing and agricultural resources of that region.

It has been known for some time that there are large areas of mineral lands along the Kuskokwim, with promising prospects of mercury-bearing cinnabar, gold-bearing quartz, placer grounds and coal lands whose development only awaited reliable means of transportation.

Contiguous to the Kuskokwim Valley are thousands of square miles suitable for reindeer grazing. Captain Lukens reports that the small government herd has grown until there are now about 6,000 reindeer. The cost of raising reindeer is very small. Three men can take care of 1,000. The animals subsist on the country the year round. Even in winter, when the ground is covered with snow, no extra feed is required for them. The meat of the reindeer is excellent food. Even with the small market afforded at present, the native herd owners are becoming prosperous, and now that better transportation is promised there is every reason to believe that this country will furnish many thousands of pounds of this meat for shipment to the United States. The Kuskokwim also has a large salmon run. Captain Lukens says that, as reliable transportation is now at hand, the canning companies are arranging to extend their operations into this region.

Secretary Redfield says that plans are being made in Seattle for the construction, by different companies, of two light draft vessels designed especially to take care of the expected development of commerce on the Kuskokwim River; and that still another shipping firm has announced sailings to the Kuskokwim at the opening of navigation next spring.

Dangers to Navigation in Alaska. Twenty-one dangerous rocks in forty-two miles of ship channel have been discovered in Alaska during the past season by field engineer John A. Daniels of the Coast and Geodetic Survey. These rocks were located by means of a wire drag more than a mile long, the wire being supported at the desired depths by cables and towed along by power boats. The ship channels covered by the wire-drag survey are in southeastern Alaska. They form a section of the well-known inside passage followed by all steamers going up and down the coast. The main thoroughfares included in the survey were Revillagigedo Channel, Nichols Passage, and Tongass Narrows.

One of these rocks is of pyramidal shape and rises over 600 feet from the bottom of the channel to within seventeen feet of the surface. The area covered by the wire drag was 60 square miles. The cost for each danger discovered was $675. These dangerous rocks have been marked on new editions of the Coast and Geodetic Survey charts and the more important ones will be buoyed by the lighthouse service. (*From the Dept. of Commerce, Washington.*)

Report of the Director of the U. S. Geological Survey. The thirty-fifth annual report (July 1, 1913–June 30, 1914) of Director George Otis Smith of the U. S. Geological Survey has just been issued. He reports that, during the fiscal year, the areas covered by geological surveys in the United States excluding Alaska were, in square miles: Detailed areal, 11,883; detailed reconnaissance, 9,335; reconnaissance, 47,840.

In Alaska, fourteen parties were in the field in 1913. The average length of the Alaskan field season is 110 days. Areas covered by geologic exploratory surveys (1:500,000) amounted to 3,500 square miles; by geologic reconnaissance surveys (1:250,000), 2,950 square miles; by detailed geologic surveys (1:62,500), 180 square miles. Much of the time of the geologists was devoted to special field problems. Topographic exploratory surveys (1:500,000) covered about 3,400 square miles; topographic reconnaissance surveys, 2,535 square miles; detailed topographic surveys, 287 square miles. In 1914 Mr. Alfred H. Brooks continued investigations of placer deposits in different parts of Alaska; and among other features of the work were further investigations of Alaska tin deposits, the auriferous lodes of the Seward Peninsula, the copper deposits adjacent to the Kuskulana R., etc.

The total area surveyed to date in the United States proper is 1,197,782

square miles, or 39.6 per cent. of the entire country. Topographic surveys were also carried on in Hawaii, the area mapped during the fiscal year being 342 square miles.

The land-classification work of the Survey included reports on 45,000,000 acres, or 70,000 square miles of public lands, an area of coal, phosphate, oil, and dry-farming lands greater than the area of all the New England States. In the collection of statistics of mineral production the Geological Survey cooperates with the state geologists of sixteen States and carries on correspondence with 90,000 producers.

Recent Work of the Coast and Geodetic Survey. The progress of the hydrographic work is reviewed in the report of the Survey for the year ending June 30, 1914. Most of the United States coast work was on the Atlantic side. Along the Pacific, revisions of surveys were begun on the Washington coast. In Alaska the approaches to the Kuskokwim River, the channels of Icy Strait and Uminak Pass, the coasts of the Shumagin Islands, as well as the west shore of Cook Inlet, were surveyed. General surveys were also prosecuted on the west coast of Prince of Wales Island.

The coast survey of the Philippine Islands was carried on under the direction of headquarters at Manila. The work consisted mainly of general surveys on the east coast of Mindanao, the approaches to Manila Bay, Samar Sea, the Calamianes Islands, northern Palawan, the east coast of Palawan and Sulu Sea and vicinity.

The geodetic, magnetic and tidal work comprised measurement of primary base lines in Colorado, Wyoming and Tennessee. Reconnaissance for triangulation was made in Washington, Oregon, California, Colorado, Utah, Wyoming, Montana, Arkansas and Oklahoma. Primary triangulation was extended in Tennessee, Arkansas and Mississippi. Astronomical latitude determinations were made in South Dakota, North Dakota, Colorado, Wyoming, Montana and on the Texas-California arc of primary triangulation. Precise levelling was done in Washington, Montana, North Dakota and Minnesota. Parties were engaged in revising and supplementing the triangulation on the coasts of Maine, Massachusetts, Rhode Island, the District of Columbia, North Carolina, South Carolina, Washington, Oregon, California, Porto Rico and the Hawaiian Islands, and in determining the geographical positions of aids to navigation along the Atlantic and Pacific coasts and in Porto Rico.

Progress is also reported on international boundaries. On the United States-Canada border the survey and demarcation of sections of the east-west line were continued. A joint American and Canadian party was furthermore engaged along the Alaskan boundary.

Large Phosphate Finds in Montana. In 1911 rock phosphate was discovered by J. T. Pardee, of the U. S. Geological Survey, at three localities in western Montana—in the Garnet Range, six miles north of Garrison; at Philipsburg; and half a mile east of Elliston. A detailed examination of the phosphate field at Elliston was begun in 1913 by R. W. Stone and C. A. Bonine, and their report has just been published by the Geological Survey as *Bulletin 580-N*. The phosphate in the south half of the Elliston field is within two miles of the Northern Pacific Railway and readily accessible to it. From the studies of the Survey it is estimated that the southern part of the Elliston field contains at least 15,204,861 tons of phosphate rock, while in the northern half there is an estimated deposit of 70,000,000 tons of rock, making a total of more than 85,000,000 tons in the whole field. These deposits have not yet been developed, owing to the recency of their discovery. (*Press Bulletin of the U. S. Geological Survey.*)

The Colorado Geographic Board. On October 28 last, at the call of the Governor of Colorado, a convention of about one hundred citizens met in Denver to consider methods of supervising and clarifying the geographical names of the state, of collecting and preserving the historical associations of towns, streams, mountains, highways, passes and other geographical features and of eliminating duplicate or otherwise undesirable names. The convention

organized the Colorado Geographic Society. The government of the Society is vested in an advisory committee now forming, which will consist of twenty citizens, who will select, with the Governor's approval, five persons to be known as the Colorado Geographic Board. The Board will be the working arm of the society, but all its findings will be referred to the advisory committee for final decision. No general revision of names is contemplated at present, but the Board will work upon such problems as are presented to it. For example, the U. S. Geological Survey has in preparation several maps of the Longs Peak region and parts of the San Luis Valley concerning which problems as to the choice between contradictory names or appropriate names for hitherto unnamed points have arisen. These questions would ordinarily be settled at Washington, but it is now planned to submit them to the Board. The Board's activities, for a long time to come, will be confined to meeting specific questions of this sort and to gathering historical and other material.

Another Change in Weather Bureau Publications. A welcome simplification and consolidation of the publications of the Weather Bureau has already been noted in the *Bulletin* (Vol. 46, 1914, p. 836) in connection with the change in the character of the *Monthly Weather Review*, beginning with January, 1914, and the discontinuance of the *Bulletin of the Mount Weather Observatory*. It is a satisfaction to note another change, which is no less welcome, toward a further consolidation of the Weather Bureau publications. Anyone who tries to keep abreast of meteorological literature must feel relieved when the number of separate publications can be reduced without diminishing the scientific output. The latest change is the discontinuance of the series of quarto *Bulletins* (A to Z) and of the octavo *Bulletins* (1 to 44), and the substitution therefor of a series of Supplements to the *Monthly Weather Review*. These Supplements are to include such contributions to meteorology as would formerly have been published as *Bulletins*, and are to appear at irregular intervals, as occasion demands. Thus, greater simplicity and greater uniformity are secured, and there is no loss anywhere.

The first of the new series of Supplements* is a brief, clean-cut discussion of the storm types of the United States and their movements. Our storms are grouped in the usual way, according to their places of origin (as seen on the weather map) and their characteristic movements, and the weather types associated with them are summarized. The normal 24-hour movements are set forth in great detail in a series of over 100 charts. There is also a useful chart showing the regions of origin of our storms and their average January tracks. A series of brief notes on weather forecasting will be found useful by those who are studying that aspect of meteorology. The report is one which well deserves to be bound and kept readily accessible in any meteorological laboratory or classroom for constant reference. R. DEC. WARD.

Agricultural Atlases of the United States. A school atlas of the agriculture of the United States is being prepared by the Office of Farm Management, Bureau of Plant Industry, in coöperation with other bureaus of the U. S. Department of Agriculture. This atlas will contain about 100 pages of maps and diagrams accompanied by a brief text. Most of the maps in groups 1, 2 and 3 will appear on the scale of about 1:8,000,000 and those in group 4 in about 1:13,000,000. The principal contents will include the following maps:

1. Relief.
2. Soils.
3. Climate: frost and the frostless season; mean temperatures, December to February and June to August; mean annual maxima and minima; sunshine; mean annual precipitation; annual frequency of utilizable rains (0.1 to 1.0 in. in a day); drought frequency; average precipitation, April to September and June to August; mean annual snowfall; prevailing wind direction, summer and winter.
4. Crop maps showing distribution by acreage and production of the prin-

* Types of Storms of the United States and their average Movements. By Edward H. Bowie and R. Hansen Weightman. U. S. Department of Agriculture, Weather Bureau. *Monthly Weather Review*, Supplement No. 1. 4to. Washington, 1914. Pp. 37. 114 Charts.

cipal crops; seed-time and harvest maps; maps showing date of bloom of certain varieties of apples.

5. Live stock distribution.
6. Farms, size, value and tenure.
7. Rural population.

The atlas will probably be published this year. It will be the forerunner of a more extensive atlas of American agriculture now under preparation. The proposed parts of this atlas are as follows:

I. Elevation and Geology; II. Soils; III. Climate; IV. Native Vegetation; V. Crops; VI. Live Stock; VII. Farms and Farm Property; VIII. Rural Population; IX. Rural Organizations.

In this larger atlas each phase will be treated in considerable detail. It is proposed to issue separate monographs, as soon as finished, dealing with each major crop and subject. It is expected that these separates will be assembled later for final publication. CHARLES F. BROOKS.

Educational Activities. The great fire at Wellesley College last year did not impair the vigorous work in geography which is carried on in that institution. Two hundred and seventy students were engaged in the study in the first term of the school year 1914-15. Miss Ellen Churchill Semple gave courses in anthropogeography and the historical geography of the Mediterranean Basin. The geography courses this year embrace physiography, economic and industrial geography, geography of North America and geography of Europe. Professor W. W. Atwood of Harvard University is lecturing on the geography of North America during the second semester. Professor Elizabeth F. Fisher, head of the Department of Geography and Geology, with Mr. Haynes, Mr. Lahee, Miss Goss, Miss Bullard and others, is carrying on the class-room and laboratory work.

The Southern Geographic Society, in cooperation with the University of Tennessee, is planning a course of university extension work. A feature of this work will be the accumulation of lantern slides and motion-picture films covering all phases of industrial and vocational education, which will be available for schools and organizations at the cost of transportation.

At a geographical round-table in Duluth, on Feb. 12, conducted by Mr. Eugene Van Cleef, in charge of geography at the Duluth State Normal School, these questions evolved a live discussion: 1. What is the purpose in teaching geography in the grades? 2. After a course in geography, what knowledge should the student have acquired? Mr. Van Cleef also gave a short talk on the "Geography of the European War."

Canadian Fish for England. The closing of the North Sea owing to war conditions led to a demand in Great Britain for fresh fish caught in Canadian waters. Three Canadian express refrigerator cars carrying 60,000 pounds of halibut taken in the Pacific off Prince Rupert, B. C., were sent to the Atlantic, shipped from St. John, N. B., and reached England in first-class condition. It is only since the recent completion of the Grand Trunk Pacific line that Prince Rupert fish has been on sale in eastern Canada and the United States. Remarkable catches are now being made in the North Pacific fishing grounds for the British market.

Utilization of Poor Soils. A report printed by the Canadian Government* relates to a part of the region through which the Georgian Bay Canal will pass, a short cut linking the waters of Lake Huron and Lake Ontario. Most of this Trent Watershed has a sandy or gravelly soil and the farming population is decreasing. The report seems to be pervaded with the idea that there is a fundamental distinction between agricultural and non-agricultural land; or, in other words, that we have much land that can never be profitably

*Trent Watershed Survey. A reconnaissance by C. D. Howe and J. H. White. With an introductory discussion by B. E. Fernow. 156 pp. Maps, ills., index. Commission of Conservation, Committee on Forests, Toronto, 1913.

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cultivated and should therefore be kept permanently in forest. Is it not a fact, however, that, as population increases, poorer and poorer land is converted to agricultural uses, while at the same time the increase of markets and transportation, the discovery of better methods of farming and of crops better adapted to poor soil, etc., tend to make farming on the poorer soils as profitable as it was on the rich soils when they were first utilized?

Illustrations of this tendency may be seen throughout the long-leaf pine region of the southeastern United States. Its soil is rather poor and sandy, and before the days of commercial fertilizers the land was regarded as fit only for grazing and timber. As late as 1880 West Florida had less than five inhabitants to the square mile, outside of Pensacola. But now that the sandy, easily tilled soil is known to respond readily to artificial fertilization, farmers are moving upon it in ever-increasing numbers, following the lumbermen so closely that there is no decrease of population when the best timber is removed. West Florida, outside of Pensacola, now has about fourteen inhabitants to the square mile, and some of the counties in the corresponding parts of Georgia and Alabama more than doubled in population between 1890 and 1900, or 1900 and 1910. In the West, dry farming and irrigation are likewise opening up new agricultural empires. ROLAND M. HARPER.

CENTRAL AMERICA AND WEST INDIES

The Scientific Survey of Porto Rico. Professor N. L. Britton, Chairman of the Committee of the New York Academy of Sciences which has in charge the scientific survey of Porto Rico, begun last year (*Bulletin*, 1914, No. 8, pp. 606-607), has submitted to Dr. Arthur Yager, Governor of Porto Rico, a report on the progress of the survey from July 1 to December 31, 1914.

The geological work was undertaken by Dr. Charles P. Berkey of Columbia University, New York, assisted by Dr. Clarence N. Fenner of the Geophysical Laboratory, Washington. A month was spent in Porto Rico in August–September. Drs. Berkey and Fenner covered more than 1,250 miles on the roads, in addition to considerable distances traveled on foot in numerous short side trips.

The object was primarily to lay a foundation for detailed studies that are to follow. Special attention was given to the most fundamental geological matters, such as: (a) determination of the kinds of rocks, (b) the geologic ages represented by them, (c) the structural relations between successive formations, (d) the grouping of the large number of small rock formations into fewer series capable of being represented on geologic maps, (e) relation of the geologic structure to the larger surface features of the island, (f) kinds of ore deposits or minerals of economic value to be recommended for special study, (g) an attempt to make a preliminary statement of the main facts underlying the geologic history of Porto Rico.

This investigation has been of the nature of a rapid reconnaissance, but it was done with enough detail to permit statements to be made of a guiding nature in all of these different lines. Many photographs were taken to illustrate the topographic and structural features, and a large number of rock and fossil specimens were gathered for laboratory study. They are judged to represent the most characteristic materials forming the geologic basis of the island.

A summary of the observations indicates that the geologic structure of the island is extremely complex and that the greater part of the formation units are igneous, and for the most part of volcanic origin. A smaller number are more simple sediments and limestones of reef type. There is very great variety in the petrographic habit of the rocks, and the individual representatives are so numerous that it would be practically impossible to map or represent them without grouping into larger field units representing each a special historical phase of development. The characteristics of these larger divisions have been determined and can be applied to the detailed work later to be done. Although the larger part of the material is volcanic, this kind of action seems to be almost wholly lacking in the later stages of the island development. The igneous history is all pre-Tertiary. Beginning with Eocene time, the island

had been worn down by erosion to a peneplain and was later submerged, while on it was developed the Tertiary shales and heavy limestone beds. A large part of the present land may have been covered by these limestones at that time. Subsequently the whole island was elevated many hundred feet above the sea, and, in still more recent time, has been heavily attacked by solution and erosion, leaving only remnants of the original limestone formation to represent this stage of history.

All of the topographic features and all of the soil diversity of the island are directly related to these underlying fundamental differences of geologic structure and composition. A preliminary report is now being prepared to cover these investigations.

The work in zoölogy by Dr. Frank E. Lutz, Mr. Roy W. Miner, Mr. John T. Nichols and Messrs. Frank E. Watson, H. G. Barber, Dr. Crampton and others is similarly summarized.

The botanical investigation has included critical studies of the collections made for the New York Botanical Garden in former years and the preparation of descriptions for publication in the final reports. The exploration of the islands Mona and Desecheo in the Mona Passage, in the early part of the year, yielded valuable information regarding the distribution of Porto Rican plants and several species new to science. Dr. J. A. Schafer spent about six weeks in July and August in the Sierra de Naguabo and obtained a valuable collection, which adds a number of known species to the Porto Rican flora.

The botanical exploration has shown some unexpected results; for example, the collection and investigation of the grasses of Porto Rico have already added forty-four species to the known grass flora of the island, increasing the list of Porto Rico grasses about thirty per cent.

New Chart of the Panama Canal. A new chart of the Panama Canal and its approaches has been published by the Hydrographic Office. It is in two sheets, No. 5000 being the northern or Atlantic portion and 5001 the southern or Pacific portion. The price of each sheet is 30 cents.

Pilot Chart of the Central American Waters. A new pilot chart is now issued monthly by the Hydrographic Office for the region between the parallels of 1° and 31° N. and the meridians 52° and 100° W. It thus embraces all of the West Indies, Gulf of Mexico, and Caribbean Sea and extends on the Pacific Ocean from Acapulco to Esmeraldas, Ecuador. As its scale is much larger than that of the older pilot charts, being seven-tenths of an inch to a degree of longitude, its hydrographic features are correspondingly more ample. The variation lines are for the epoch 1915. The meteorological features, as in the case of the existing pilot charts, are furnished by the U. S. Weather Bureau. The first issue was for January, 1915.

Cuban Rainfall and English Rainfall. At the May meeting of the Royal Meteorological Society (London), Mr. A. Hampton Brown, in a paper entitled "A Cuban Rain Record and Its Application," referred to another new correlation between the rainfalls at places far apart from one another. The data used are the rainfall records of the Belen College Observatory, Havana. The period covered is 1859-1912. The average rainfall for the fifty years 1861-1910 is just under fifty inches, but during the past fifteen years there has been a tendency to diminished amounts. The rainfall year may be divided into two seasons: a wet, from May to October, and a dry, from November to April. The writer has endeavored to trace the connection between the wet season at Havana, during May to October, and the precipitation in southwest England and South Wales during the three months January to March following. He has found that from 1878 onward an excess of rainfall in Havana during May to October was generally followed by a deficient rainfall in southwest England at the beginning of the next year, and *vice versa*. For the eight years 1888-1895, when the rainfall at Havana was continuously in excess, in southwest England the figures, with one exception, were the reverse. During the next five years, 1896-1900, there was a deficiency at the Cuban station, and, excepting 1897, an excess in England. There were years in which

the correlation was not apparent, but the general continuance of the see-saw movement has been so persistent that it cannot be regarded as merely coincidental.
R. DEC. WARD.

ASIA

Indian Monsoon Rainfall. The summer monsoon rains control all conditions of life in India to such an extent that from almost the earliest days of English settlement there attention has been directed to the forecasting of the character of these rains. The study of the controls of the monsoon rainfall has led the Indian meteorologists and others to many very interesting, and some rather surprising, conclusions. The latest investigation, by Dr. Gilbert T. Walker, Director-General of Indian Observatories, is entitled "A Further Study of Relationships with Indian Monsoon Rainfall" (*Mem. Indian Met. Dept.*, Vol. XXI, Part VIII, 1914). It appears that attempts to forecast the general character of the monsoon five months or more before its arrival on the basis of the previous pressures are unsuccessful. The heating of the plains of India, and the resulting lowered pressure, are a very essential part of the mechanism which results in bringing the moist air from the South Indian Ocean across the equator to India. It would seem, therefore, that years of high temperature over India (in May) would be years of good rainfall, and *vice versa*. An examination of the question has not shown this to be the case, at least so far as temperatures measured in the usual way are concerned. It does, however, seem possible that the temperatures in the upper air may be higher in years of abundant monsoon rainfalls, although observations are thus far lacking. A relation of the icebergs in the southern ocean to the Indian monsoon rainfall has been suggested, but Dr. Walker fails to find "a material influence" of this sort.
R. DEC. WARD.

EUROPE

Geography and the War. The *Geographische Zeitschrift*, beginning with the November, 1914, number (Vol. 20, No. 11), is to devote the greater part of its leading articles to the war. Geographical aspects of the military campaigns, the political problems and the economic effects of the war will be discussed. The first number contains an introductory article by Professor A. Hettner, the editor, entitled "Our Task in the War"; a paper by Professor J. Partsch of Leipzig on the geography of the Polish campaign (to be continued); and a geographical estimate by A. Dix of Berlin of the conflicting interests and aims of the belligerents and the economic effects of the war.

The *Deutsche Kolonialzeitung* (No. 33, Dec., 1914) says that it will again appear monthly in 1915. The December number is devoted to an account of the effects of the war upon the German colonies.

Prof. Dr. Alfred Grund, Professor of Geography at the University of Prague, has been killed in battle in Servia. He was born in Prague. He served as assistant director of the Institute of Oceanography at Berlin in 1910, whence he was called to a professorship in Prague University.

Count Julius von Zech, formerly Governor of Togo, Africa, who went to the front as a Major in the German army, has been killed. For fifteen years he was an active factor in the progress of the Togo Colony.

Major John Beaufort Corry, 3rd Sappers and Miners, Indian Army, was killed by a howitzer shell on Nov. 4 while in charge of a party digging trenches in Flanders. He was forty years old, a member of the Alpine Club, a mountaineer of reputation, and owing to his capacity for finding his way among mountains he was selected as leader of the Kashmir Expedition. He was killed four days after landing at Marseilles from India.

GENERAL

An English Translation of Brunhes' "La Géographie Humaine." Professor Bowman of Yale and Professor Dodge of Teachers College, Columbia University, have been engaged, during the past half-year, in the adaptation of Brunhes' "La Géographie Humaine" for English and American use. The volume will be completed by mid-summer, and will be published by Rand, McNally & Co.

PERSONAL

Dr. Arnaldo Faustini of the Popular University of Rome, known as a writer on Polar topics, is at present in our country. He has delivered a number of lectures in New York on Polar explorations and geography and on volcanoes and earthquakes in Italy.

Mr. Charles Hallock, the well-known author and naturalist, founder of the periodical *Forest and Stream*, and of the International Association for the Protection of Game, and occasional contributor to our *Bulletin*, is now, in his advancing years, living at the John Dickson Home in Washington. Mr. Hallock is full of reminiscences of the years he spent in nature study and of the many friends who were especially interested in or shared his labors.

Professor Lawrence Martin of the University of Wisconsin gave an illustrated lecture entitled "Alaskan Mountains and Glaciers in Relation to Railway Routes" before the Appalachian Mountain Club on Jan. 27 in Huntington Hall, Boston. He repeated the lecture before the New York Academy of Sciences on Feb. 1, and also spoke at the geological conference at Harvard on Jan. 26 on "Muir Glacier in 1911 and 1913."

Captain Ejnar Mikkelsen, whose latest work in the Arctic resulted in the recovery of important records of Mylius Erichsen in East Greenland, was in New York City for a few days early in February on his way to the Danish West Indies.

Dr. Eug. Oberhummer, Professor of Geography in the University of Vienna, who had expected to lecture at Columbia University during the second half of 1915, in spite of the war, has been forced to abandon his plans.

Professor R. D. Salisbury of Chicago lectured on "In and About Patagonia" before the Southern Geographic Society at Knoxville, Tenn., on Jan. 13. The Society has arranged for seven other lectures during the season ending in May.

OBITUARY

Vincenz Haardt von Hartenthum. This well-known cartographer of Austria is dead at the age of 71 years. He was long at the head of the cartographical establishment of E. Hölzel, Vienna, which produced many of his best-known works, including his wall map of the Alps, ethnographical map of Asia, maps of the North and South Polar areas, the Balkan Peninsula, educational maps, etc. Later, in the service of the k. k. Militärgeographisches Institut, he produced a series of maps of European countries and other valuable works.

Vice-Admiral Sir George Nares. Vice-Admiral Nares died in London on January 15 at the age of 84. He entered the British navy in 1845, but won his highest distinction in the field of exploration. From 1851 to 1854 he served on the *Resolute* under Sir E. Belcher in the search for the Sir John Franklin expedition and took part in the sledge journeys in quest of traces of Franklin. During these journeys the sledge parties were able to cover large tracts and to delineate the coast line of numerous islands and straits. In 1872-1874, he commanded the ship *Challenger* on the famous Challenger Expedition, whose remarkable results in the fields of oceanography, meteorology and other branches of science fill fifty large volumes. In 1875-1876, he commanded the British Arctic expedition in the *Alert* and *Discovery* which passed through the Smith Sound channels to the Arctic Ocean north of Grant Land, made large additions to our knowledge of the American Arctic, but failed in its primary object to reach, if possible, the North Pole. In 1878, he again commanded the *Alert* in carrying on survey work in Magellan Strait. For the last twenty years of his active life he was Marine Adviser to the Board of Trade, London. He was an Honorary Member of the American Geographical Society.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

Soils of the United States, 1913. By C. F. Marbut, H. H. Bennett, J. E. Lapham, and M. H. Lapham. 791 pp. Maps. *U. S. Bur. of Soils, Bull. 96.* Washington, 1913.

This bulky bulletin practically supersedes *Bulletins 55 and 78.* It is really an encyclopedia of our soils, exclusive of Alaska and other outlying possessions. A ten-page introduction by Prof. Marbut discusses the principles of classification. The country is divided into thirteen more or less natural subdivisions. The first seven, east of the Plains, are called "provinces," and the remainder "regions." Each province or region differs from the others in geology, topography, climate, or vegetation, and, of course, in soils. They are described in considerable detail, an average of fifty-five pages, or nearly 50,000 words, being devoted to each of the thirteen.

To the geographer, probably, the most interesting feature is the system of subdividing the country, as shown by an excellent colored map. The subdivisions correspond in a general way with the physiographic provinces that have been recognized by American geographers for the last two decades or so, but have the advantage that they are based on soil as well as topography, and therefore ought to fit the known distribution of vegetation and crops better than a purely topographic system would. They are certainly superior to the system of parallel "life zones" based on temperature, which have been used by the Biological Survey of the Department of Agriculture since about 1894.

The large map in the back of the book is one of the very few that treat the glacial lake and river terraces as distinct from the rest of the glaciated region, a distinction probably well founded, from the standpoint of soils at least.

The very complex geography of the coastal plain has evidently never been fully understood by the authors and their associates. They divide it into only two parts, namely, the flatwoods and prairies near the coast and the more elevated and dissected portions farther inland. As a matter of fact, the flatwoods (of which there are several kinds) constitute only a few out of several dozen very distinct geographical divisions. The statement on page 222 that the flatwoods belt extends across Florida through Live Oak is incorrect. To go from the coast of Georgia to that of West Florida without leaving the flatwoods one would have to pass around the south end of the lake region, below latitude 28°. An excellent map of the principal subdivisions of the southeastern coastal plain and neighboring territory is that of Hilgard in the fifth volume of the Tenth Census. The reviewer has published maps of similar import, which are comparatively easy of access, for the coastal plain of the Carolinas and the whole of Georgia, Florida, Alabama and Mississippi. ROLAND M. HARPER.

Trails of the Pathfinders. By G. B. Grinnell. x and 460 pp. Ills., index. Charles Scribner's Sons, New York, 1911. $1.50. 8 x 6.

The explorations of Henry, Carver, Mackenzie, Lewis and Clark, Pike, Henry (the younger), Cox, Gregg, Parker, Farnham, and Fremont are described. The author quotes often and at length from the writings of these men. Some of the Indian atrocities, given in detail, do not make suitable reading for all readers. There is no formal summary of the meaning and results of each expedition. It would have added to the value of the book if such summaries had been made. There are many illustrations and a map showing most of the routes traversed. WILBUR GREELEY BURROUGHS.

XUM

Masters of the Wilderness. By Charles B. Reed. (Fort Dearborn Series.) ix and 144 pp. Univ. of Chicago Press, Chicago, 1914. 7 x 4½.

This book is divided into three parts: 1. "The Masters of the Wilderness." It deals with the Hudson Bay Company from its origin to modern times; the inner workings of the company, its connection with the Indians and everything that goes to make a complete history of the Company is considered.

2. "The Beaver Club, some social aspects of the Fur Trade." At Montreal, in 1785, the Beaver Club was organized. Its object was to bring together influential men who, engaged in the fur trade, had spent their best days in the savage country of Canada. The club, for forty years, wielded immense power, socially, commercially, and politically. The Northwest Company, rival of the Hudson Bay Company, is also treated in this chapter.

3. "A Dream of Empire, The adventures of Tonty in Old Louisiana." The author gives the history of Henry de Tonty, La Salle's most loyal friend and efficient aid.

The book is written in a clear, concise style. There are several maps, illustrations, and bibliography. WILBUR GREELEY BURROUGHS.

Terres et Peuples du Canada. Par Emile Miller. 192 pp. Librairie Beauchemin, Montreal, 1912. 50 cents. 7½ x 5.

This little volume is an interesting and valuable contribution to the literature on Canadian geography. The author is familiar with the teachings and methods of such scholars as Vivien de Saint-Martin, de Lapparent, Suess, Elisée Reclus, Marcel Dubois, and Leroy-Beaulieu. Furthermore, he is well informed upon matters of Canadian geology and physical geography, as well as upon the fundamentals of the racial question in Canada. He, therefore, was well equipped to write a volume in which the modern viewpoint in geography should be presented. The influence of the physical environment upon the life history of the people has been kept in the foreground. The volume is composed of three main sections, dealing respectively with the physical habitat, the people, the country and the people. In the second main division there is much of Canadian history packed into the three chapters upon French colonization, the British régime, and Confederation and its results. There is a well-written introduction by Abbé Adélard Desrosiers. AVARD L. BISHOP.

Through the Grand Canyon from Wyoming to Mexico. By E. L. Kolb. xix and 344 pp. Ills. The Macmillan Co., New York, 1914. $2. 8 x 6.

The story of the quest of two brothers for moving-picture films of the Colorado, from Green River, Wyoming, to the Gulf of Mexico, in which the Grand Canyon of the Colorado, of course, was the principal feature. It is a plain, unvarnished tale of daily experiences, running rapids, making camp, toiling over portages in this little-traveled region. The voyagers adopted a novel plan of floating their boats, stern foremost, down the stream, rowing against the current, to moderate their speed. Even with this precaution they met with many a mishap, suffering damage to their supplies and outfit through the overturning of their boat in the rapids. The pioneers showed courage in surmounting the difficulties of their trip. Owen Wister writes an appreciative foreword. DAVID H. BUEL.

SOUTH AMERICA

Colombia: Physical features, natural resources, means of communication, manufactures and industrial development. B. V. Lévine. xii and 220 pp. Maps, ills., index. D. Appleton & Co., New York, 1914. $1.50. 9 x 5½.

A handbook for the promoter, tourist, and settler, giving a summary account in methodical order of the advantages and disadvantages of Colombia. The lists of important towns, of steamship and river service, of Colombian currency, weights and measures, land laws, work and wages, of diplomatic and consular officers, and of conventions and treaties are useful. The comparative table of South American currency is valuable.

The account of the history of Colombia, in the body of the work, seems somewhat to sacrifice clearness to brevity. The merest mention is made of the formation of the Republic of Panama and of the part played by this country in it. DAVID H. BUEL.

Colombia. By Phanor J. Eder. xxiv and 312 pp. Map, ills., index. Charles Scribner's Sons, New York, 1913. $3. 9 x 6.

This is a professedly impartial and sympathetic account of the Republic of Colombia from the viewpoint of the capitalist and commercial promoter. Colombia, with the geographical peculiarity of being washed both by the Atlantic and Pacific, is, nevertheless, a country with no well-defined political boundaries on the land side, excepting along the Brazilian frontier. With unrivalled natural resources, mineral and vegetable, it still has vast unoccupied and even unexplored areas. The means of travel and transportation are most crude and primitive. The few miles of railroad are isolated, the river transportation is insufficient, and the systems of finance and banking hitherto in use have almost prostrated credit and commercial transactions. The government is highly centralized and subject to frequent change. Prison reform is entirely unknown. Education, with its universities and public schools, all under clerical control, has left seventy per cent. of the population unable to read or write. Literature has resulted in a single novel, "Maria," which lives among the Spanish-speaking people of South America. DAVID H. BUEL.

Peru: Physical features, natural resources, means of communication, manufactures and industrial development. By E. C. Vivian. vii and 235 pp. Maps, ills., index. D. Appleton & Co., New York, 1914. $1.50. 9 x 6.

This book, dealing with Peru, is one of a series of volumes on South America. The subjects treated are geography, climate, flora and fauna, history of the country from its beginning, description of the Inca and Pre-Inca ruins, politics, finance, manufactures, commerce, transportation, harbors, natural resources, and occupations based thereon.

There are valuable tables giving the imports of Peru in 1910, by articles and by the leading countries from which each article came; other tables analyze the Peruvian exports. A gazetteer of the chief towns and an appendix containing a postal and telegraph guide, steamship services, Peruvian currency, weights and measures, commercial treaties and conventions, etc., complete the book. WILBUR GREELEY BURROUGHS.

Through the Brazilian Wilderness. By Theodore Roosevelt. xiv and 383 pp. Maps, ills., index. Charles Scribner's Sons, New York, 1914. $3.50. 9½ x 7.

The professional naturalists mourn because Colonel Roosevelt did not elect to follow their calling to the exclusion of statecraft. It is the testimony of more than one of the great scholars in American history that "The Winning of the West" has qualities that place its author in the front rank of historians, and since the publication of "African Game Trails" and "Through the Brazilian Wilderness" geographers hail our energetic ex-President as one to the manner born. In what follows we are dealing with only that part of his latest scientific book which is of geographical interest.

The account of the discovery of the new river is so well known that we need not dwell long on this feature. It was a first-class piece of real exploration. With his usual luck (?) Colonel Roosevelt selected just the region that would yield the most striking result and "put on the map" a river over 900 miles long. But how shall we spell it now that we have it on the map? "Téodoro," as on page 338?

Geographers were no less annoyed than Roosevelt himself when, following the announcement of the discovery, there arose the usual controversial clatter from ignorant but pretentious critics. Our source maps plainly indicated profound ignorance concerning an area large enough to hold two rivers of the size of the Téodoro. The most absurd criticism related to the course of mountains said to cut across the path of the reported river and to make its existence im-

possible. The Columbia at "The Cascades," the Urubamba at "Pongo de Mainique," the Rhine at the crossing of the Ardennes are only a few of the best known of scores of cases where a river cuts straight across a mountain range without violating the law of gravity. Apparently these critics were ignorant of such elementary drainage features as "antecedent," "superposed" and "captured" streams.

In spite of the great natural difficulties in the way of gathering this information in the field, we wish we could learn something from the book about the topography and lithology of the mountain ridges at the parallel of eleven degrees south. They are of immense interest in defining the border of the Brazilian highland and in determining the position of the still more ancient mountain axes that run beyond the highland belt into the plains country of southwestern Amazonia. An exploration of these topographic features would be well worth undertaking, especially if it were combined with a study of the drainage and the forest flora.

We are impelled to say in this connection that the book contains but one defect from the geographic standpoint, and that is the apparent approval of Church's explanation of the hydrography of the Madeira system (p. 232). Church's work deserves great respect. Much of it was the fruit of severe toil by "a real wilderness explorer." Yet some of his most confident explanations, while original and indeed brilliant, were really hypotheses and not explanations. The "Andean Sea" ("Pampean," of Church?) lacks confirmation. If a huge alluvial fan or foreland plain were built eastward of the Andes, thus (and not by "upheaval") reversing the Madeira, it would be an interesting occurrence; but we have yet to find other proof of the reversal than the existence of such a fan. There is a distinction between a *competent* agent and an *actual* or *operative* agent. It would be laboring the point to carry thus far the discussion of what is, after all, but a minor feature of the book, if it were not for the wide publicity given the proposed explanation of Church by so deservedly popular an author as Roosevelt.

One of the best contributions of the book is the light it throws on the work of the Brazilians themselves, especially that of Colonel Rondon and his associates, Captain Amilcar and Lieutenant Lyra. Portuguese is read by so few scientific men, and the Brazilian government is so modest in the exploitation of its remarkable reports, that the reading public, and even specialists, know altogether too little of the work of Brazilian explorers. The achievements of the Brazilian Telegraphic Commission in the northern part of Matto Grosso are extraordinary in every respect.

A practical cattleman like our author could not fail to be impressed by the possibilities of the grasslands of the great Plan Alto of Brazil and of the Gran Chaco of Paraguay and Bolivia. There are excellent descriptions of ranch life in remote corners of Brazil. One of the most characteristic is that of the ranch on the Taquary, the ride through the marshes that alternate with patches of higher ground topped with clumps of palm, and the half-clad ox-drivers and horse-herders at the river landing. The herds and cowboys of the Chaco; the contrast between the grass-covered Parecís Plateau, on the edge of the high central plain of Brazil, and the Paraguayan marshes; the hamlets along the Upper Paraguay; the economic state of the scattered and isolated communities on the fringe of civilization; the religion and morality of the frontiersmen—all are brought into the story. Such work by a trained and reliable observer serves two purposes: it makes known some of the most interesting places in the world, and if there come great changes in the state of civilization of these frontier societies, the accurate description of their early state has immense historical interest.

ISAIAH BOWMAN.

AFRICA

Geschichte der Aufteilung und Kolonisation Afrikas seit dem Zeitalter der Entdeckungen. Von Paul Darmstaedter. 1. Band: 1415-1870. viii and 320 pp. Maps, index. G. J. Göschen, Berlin, 1913. Mk. 7.50. 8½ x 6½.

This volume carries the history of the European advance upon Africa from the first days of Portuguese enterprise down to 1870. In 1870 the exploitation

of Africa was to all intents in a resting stage. Sparsely threaded along the coasts were unimportant little settlements under European flags and behind was the great blackness of the life that was Africa. How these settlements had come into being, how European nations had invented the theory of "hinterland" and had then gone to sleep upon their rights, this is the theme of the volume. The obscure has possessed a peculiar charm for the author, and the difficulties which beset the student of these movements of European colonization have attracted him to the most recondite investigation. Perhaps the most obscure chapter of African history is the Swedish settlement upon the Guinea coast. Beyond the mere fact that there was such a settlement little has been known. Darmstaedter gives the first complete narrative of the incident. A second volume is promised which shall cover the newer history of the partition of Africa. It will be awaited with interest by all who have found the charm of this opening volume. WILLIAM CHURCHILL.

The Women of Egypt. By Elizabeth Cooper. 380 pp. Ills., index. F. A. Stokes Co., New York, 1914. $2. 8 x 5½.

The record of a western woman's attempt to penetrate the seclusion of the Egyptian harem and learn from the Egyptian woman herself what her life is and how she looks upon life. The attempt is most praiseworthy and was quite thoroughgoing, and yet little that is new to those familiar with the subject has been uncovered. It has long been known that Moslem women approve of their own enclosure in the home, and are strenuous upholders of it; that the freedom of the Moslem husband to divorce his wife and to introduce other wives into his family is the pivot upon which the family life of Islam turns. The familiar intercourse of the writer with Egyptian women of all classes throws pathetic interest over the position of women in the Mohammedan world.

DAVID H. BUEL.

Taschenbuch für Südwestafrika 1914. 7. Jahrgang. Herausgegeben von Kurd Schwabe, P. Kuhn, G. Fock. Part 1: 258 pp. Part 2: Verkehr, Ansiedlung, Statistik. 125 pp. Part 3: Gesetze und Verordnungen. 368 pp. Index. D. Reimer (E. Vohsen), Berlin, 1914. Mk. 6. 6½ x 4½.

For the person who intends touring Southwest German Africa, as well as the individual who wishes to make an intensive study of the region, these books recommend themselves. The first volume is of value for information concerning latitude and longitude of important places and some other miscellaneous data. Volume II contains details relative to transportation facilities, both locally and with other regions, a description of economic conditions, and important statistics of the region. Volume III presents the laws of the country.

The material seems to be well organized; it is compactly written and systematically arranged. The information is just the sort one would desire who is making his first entrance into a foreign land. These books are intended probably not so much for the average tourist as for the man on business or the settler. These handbooks are well worth while. EUGENE VAN CLEEF.

ASIA

The Odyssey of the Philippine Commission. By Daniel R. Williams. 364 pp. Ills., index. A. C. McClurg & Co., Chicago, 1913. $1.75. 7½ x 5.

A chronological record is, perhaps, the most difficult sort of material to present interestingly. The author of this book has succeeded remarkably well; and the information imparted is of much value. The reader may learn from the book not alone of the political relationship between the United States and the Philippines, but also of the geography of our island possessions and the full meaning of the position of the Philippines in Asiatic waters close to China and Japan. The reader may derive from the book a clear idea of the topographic, climatic, agricultural and industrial characteristics of the islands and of the types of peoples, with their habits and customs. The author served in an official capacity in the islands when the commission began its work in 1900, and has been intimately associated with the region ever since. A good map is the only thing lacking. EUGENE VAN CLEEF.

XUM

Through Persia. By F. B. Bradley-Birt. 316 pp. Ills., index. W. Collins, Sons & Co., Glasgow, 1909 (?). 1s. 6½ x 4.

A ten years' residence in India, in an official capacity, has given the writer of these impressions that familiarity with the Oriental mind and viewpoint which is well-nigh indispensable to an understanding of the Persian people. What stands out prominently in the book is the remarkable but well-known fact that the indigenous fire-worship of Persia has been driven out of the country by the faith of Islam. The Moslem "Inshallah," "if God wills," expressing fatalism, is the keynote of the indolent and imperturbable Persian character. DAVID H. BUEL.

The Cradle of Mankind: Life in Eastern Kurdistan. By the Rev. W. A. Wigram and E. T. A. Wigram. xii and 373 pp. Ills., index. A. & C. Black, London, 1914. 12s. 6d. 9 x 6.

As the work of two hands this volume combines the facility of one author with the deeper information of the other. The junior writer records a three months' scamper through Kurdistan, and as such his work is merely a book of travel; but there is always the store of the elder's knowledge to draw upon, with the result that, in certain important chapters, we have a very full statement of interesting information about the Kurds, the Armenians, the several varieties of Syrian Christians in the mountains (whom, by the way, the authors commonly designate Assyrians), and the Yezidi or devil-worshippers of Mosul. The principal theme is the examination of the religious phase of the life of the mountaineers. But the authors find great interest in the rude society, no matter what its creed, and draw parallels with the Highlanders of Scotland.

Bibliotheca Japonica. Dictionnaire bibliographique des ouvrages relatifs à l'Empire Japonais. Rangés par ordre chronologique jusqu'à 1870, suivi d'un appendice renfermant la liste alphabétique des principaux ouvrages parus de 1870 à 1912. Par Henri Cordier. 762 pp. E. Leroux, Paris, 1912. 11 x 7½.

It is a pleasure to chronicle the completion of this work, which has been promised for nearly thirty years, for Cordier has long ranked as the foremost student of the literature of the Far East. In this volume he has carefully subjected to recension the bibliography of Wenckstern (1895), with correction of the many errors which made that work untrustworthy. Prof. Cordier set 1870 as the limit of his record, but in an appendix he has set down the preliminaries of a continuation to 1912. The work thereby falls into two divisions. Of the former it is impossible to say too much. He follows the form established by the Japan bibliography of Léon Pagès in 1859 and records the entries in chronological order, dated by the year of the first work of any author and then completing the author record before passing to the next date. In the earlier years, when the literature concerning Japan was confined to the annual letters of the Jesuits or the voyage reports of individual seafarers, this arrangement does not operate as an interruption of the strict order of chronology. In the appendix he professes to present only the more important works of the period subsequent to 1870. This appendix is far less satisfactory, for we find it impossible to discover the relative scale of importance. He includes Lafcadio Hearn in a fairly complete list, but he also includes a scantily important pamphlet by Charles Wolcott Brooks on wrecked junks in the Pacific; yet we find no record of the highly important literature of the Forty-seven Loyal Ronins, which is a most important document of Japanese history. WILLIAM CHURCHILL.

AUSTRALASIA AND OCEANIA

The Land of the New Guinea Pygmies. An account of the story of a pioneer journey of exploration into the heart of New Guinea. By C. G. Rawling. 360 pp. Map, ills., index. Seeley, Service & Co., London, 1913. 10s. 6d. 9 x 6.

This is a second narrative of the British ornithological expedition toward the snowy mountains of Dutch New Guinea. The failure of the expedition has

already been noted in the review of Wollaston's report (*Bulletin*, 1913, p. 376). This independent account sets forth even more clearly the mistakes in outfitting, the serious error made in recruiting the force of carriers, the unfortunate choice of the particular river up which to attempt to reach the mountains, and particularly the cruel absurdity of victualing a party of tropical explorers with provisions which had been collected for Sir Ernest Shackleton's expedition into the Antarctic. Captain Rawling has written the story of the exploration with great ease and with an unselfish absence of bitterness against the error of judgment which bore with such pressing weight upon the members of the party in the jungle. He seems to have seen somewhat more of the pygmies of the headwaters of the Mimika than did Dr. Wollaston. At least he penetrated to their hamlet of Wambirimi and made the acquaintance of this particularly shy race. It was neither a complete nor a cordial acquaintance, for the men kept their women hidden during the whole of the stay of the white men in their country. It is, of course, yet far too early to attempt to adjust these folk so briefly seen to any position in the present classifications of the human race. It will be well to bear in mind, however, with particular attention that in Indonesia we encounter pygmy and pygmoid men, in every case in the inner parts of islands whose more accessible coasts are filled with a slightly more advanced culture. Of such we note, merely as a memorandum, the Semang, the Punan, the Aeta, to be studied with these Tapiro of New Guinea. When we note that it is within the same geological horizon that we have the *Pithecanthropus erectus* of Dubois from the Trinil deposits it is not without considerable warrant that we may propose tentatively the possibility of a focus of human evolution in this region between Malacca and the Philippines.

WILLIAM CHURCHILL.

The Family among the Australian Aborigines. By B. Malinowski. xv and 326 pp. Index. Monographs on Sociology, Univ. of London, 1913. Hodder & Stoughton, London. 6s. 8½ x 5½.

In this valuable treatise Dr. Malinowski has assembled all the reports upon Australian life and has subjected them topically to a critical analysis of the utmost importance. He considers the family in its gross relation to the tribe as more or less gentile, and in its minute anatomy as related to the conditions of the life of a man and a woman together as mutually affecting one the other, and the child as the third term in the equation. In this more minute sense he discusses the family in three principal themes—the sexual, the economic, and the sentimental. His discussion of the first theme will be found particularly satisfactory. It is not long ago that the anthropologists waged war over the first reports from Australia that there were folk who were ignorant of the part of the father in establishing the life of the child. Here we have gathered all the records upon this point, and in the able treatment which Dr. Malinowski has given them the last doubt is cleared away. In the economic aspect of the family life of these savages of the lowest type he makes it plain that the use of the woman as a beast of burden is not to her an evil. She contributes to the life of the family that which she can and finds a balance of the account in the service contributed by the man in war and the chase, where she would be ineffective. The sentimental aspect of such marriage is less easy to comprehend, because we approach it with a burden of fixed ideas; but the author masses a considerable body of information to show that within their limitations the Australians have the sense of affection in married and parental life. The work will long remain of great value to workers in the field of sociology and will prove a mine of information for psychologists.

WILLIAM CHURCHILL.

Deutsch Neu-Guinea. By R. Neuhauss. Vol. 1: xvi and 534 pp. Vol. 2: Völker-Atlas. 336 plates. Vol. 3: Beiträge der Missionare Keysser, Stolz, Zahn, Lehner, Bamler. 572 pp. Maps, ills., index. D. Reimer (E. Vohsen), Berlin, 1911. 11 x 8.

The highest commendation must be given to the method of inquiry which Dr. Neuhauss has pursued in his investigations in a country largely new. For the most part his research has been in the coastal region of Huon Gulf north-

XUM

ward from the British boundary. Here he enjoyed the skill of the missionaries who have been established in that field for about a decade and have acquired facility in the languages of the shore, and through the extension of their endeavors upon the hill folk who have been induced to visit the coast have paved the way for further work inland. One of his volumes is given over entirely to collections of myth and popular tales which have been gathered and translated by several of these missionaries. As many of these tales are common to a somewhat wide diversity of language and several common to a wide separation geographically, we are able to check one version against another and thus assure ourselves of the substantial accuracy of the work. The mission collectors of this material have not attempted annotation, nor has Dr. Neuhauss ventured upon comparative treatment; we are, therefore, in possession of original material which is quite free of the bias of interpretation to accord with some preconception. In the northern part of Kaiser Wilhelmsland he made a hasty visit to the communities scattered near the Dutch boundary. A pleasing result is the accumulation of a brief vocabulary of the Sissano speech, which, in connection with briefer yet more scientific notes by Captain Friederici, forms the base of a monograph which I am now bringing to completion. Dr. Neuhauss shows himself a most interested observer. For the most part his notes are set down without apparent predisposition to any theory of the New Guinea culture. He shines as a photographer. He has illustrated the work with an abundance of views and sections of cinematographic records, and one volume is quite given over to portraits in duplicate, profile and full face of hundreds of individuals of the communities which he has visited. While the work is largely ethnographical, there is a considerable record of geography and geology of the most valuable description. WILLIAM CHURCHILL.

EUROPE

Twenty Centuries of Paris. By Mabell S. C. Smith. ix and 400 pp. Maps, ills., index. Thomas Y. Crowell Co., New York, 1913. $2. 8½ x 6.

To comment on this work as sketchily done is the best praise. The archæologist and the historian have more and better sources of information when they wish to study any epoch of Paris. But to those who merely flit along the boulevards this book is happily addressed, a revelation which, more seriously phrased, would certainly escape them. In a chapter for each century and two more for good measure the tourist and the red-guided sightseer may find their eyes opened to a Paris that at times has been dark and bloody, but always the goal of the great desire. It is well to have recalled to our minds that the great city has had a continuous history from a rude period antedating the Christian era. It is by no means the oldest town with such a record; Athens and Rome come out of a past of riper culture at an earlier age; even Marseilles is more ancient. But Paris attracts far more than the remains of classical antiquity. It is the capital of our Western culture and its history cannot fail of interest in every century of that growth, which is our own history. There are disputable points in this volume. Some of its history may strike the historical student as a little awry, some of the identifications may be not wholly sound, but in every such case the author has followed the majority interpretation. The book will serve its best end when it reminds the traveler that he walks on historic ground and that its past is his inheritance. WILLIAM CHURCHILL.

The Cathedrals of Southern France. By T. Francis Bumpus. viii and 224 pp. Ills., index. J. Pott & Co., New York, 1914 (?). $2. 7½ x 5.

This companion of a previous volume, "The Cathedrals of Northern France," will interest the lover of ecclesiastical architecture. The fine halftone reproductions of photographs of the edifices described in the text are no little help to a clearer understanding of the account given of their architectural peculiarities. The cathedrals are described in the order of their geographical distribution, but those of Brittany are included, as there was no space for them in the previous volume. Here and there ecclesiastical lore is mingled with the description of architectural detail, such as the account of the history of the Hymn "Vexilla regis prodeunt," of the Roman Breviary, written by Venantius

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Fortunatus, who died in 609, and the fact that the Monastery of Pontigny sheltered successively Thomas à Becket, Stephen Langton, and Edmund of Canterbury. DAVID H. BUEL.

The Ideal Motor Tour in France. By Walter Hale. xvii and 301 pp. Map, ills., index. Dodd, Mead & Co., New York, 1914. $1.50. 7½ x 5½.

On Old-World Highways. A book of motor rambles in France and Germany and the record of a pilgrimage from Land's End to John o'Groat's in Britain. By Thos. D. Murphy. 388 pp. Map, ills., index. L. C. Page & Co., Boston, 1914. $3. 8 x 5½.

These two books cover largely the same route: the first elects, as an individual preference, the Mediterranean coast of France, while the second extends his journey into southwestern Germany and describes at length the possibilities of Great Britain as a motoring paradise. Either book will be of great value to one looking for a pleasant line of travel by motor. Mr. Hale gives definite directions as to hotels, condition of roads and time of travel, with directions for side trips, and for this reason it is less interesting to the general reader than Mr. Murphy's work. Mr. Murphy seems to feel the spell of the land he visits, so that there is an atmosphere and an inspiration in it for the man who can know of Europe only through the pen of the traveler. Mr. Murphy leaves the regular lines of travel, at times, and gives glimpses into nooks not ordinarily described. On the other hand, Mr. Hale's book is based on nine years of motoring over the roads of Europe, and with this experience, the neophyte seeking a comfortable route, will do well to listen to him. Both books are well illustrated, but Mr. Murphy's is superior in this respect.

ROBERT M. BROWN.

Burgundy: The Splendid Duchy. Studies and Sketches in South Burgundy. By Percy Allen. xix and 302 pp. Map, ills., index. James Pott & Co., New York, 1912 (?). $2.50. 9 x 6½.

This is one of a somewhat rapidly growing class of travel notes. In the class, as a whole, one may sense the Baedeker not far below the surface and the rest may be described as appreciation and pictures. The pictures are not much, whether in line or in color. Unfortunately the two themes which the author has selected—the rivalry of the great abbeys of Cluny and Citeaux and the rivalry of the great dukes of Burgundy and the kings of France—are very debatable ground. They are by no means to be settled in the limits of a book designed to add intelligence to an excursion ticket for a summer scamper in France. Yet work such as this does serve a good end. It is highly probable that the trippers who will take this book into Burgundy will acquire from it a stock of information which otherwise might lie wholly beyond their notice.

WILLIAM CHURCHILL.

The Spell of Tyrol. By William D. McCrackan. xx and 328 pp. Map, ills., index. The Page Co., Boston, 1914. $2.50. 8 x 5½.

An excellent description of the characteristic scenery and life of the Tyrol, written by one who appreciates the struggles of the mountain people and has allowed himself to be swayed by his affections. Prospective visitors to the region may find the volume not only a guide to its natural wonders but, better still, an interpretation of the deeper feelings of the inhabitants, without which no true knowledge of the Tyrol can be gained. It cannot be said that the book devotes itself consistently to any phase of the story, nor are the chapters arranged in any very orderly way, but if the spirit of the book is felt the reader will not care. The author halts his journey to describe the beauty of some mountain peak or secluded lake, turns back into the past and brings to life Tyrol's leaders in peace and war, and believes that the Tyrol of to-day reflects in its people the grandeur of its scenery and its heroic past.

ROBERT M. BROWN.

Autour du Cercle Polaire. Norvège—Suède—Danemark. Par Paul de Genis. 239 pp. M. Rivière et Cie., Paris, 1913. Fr. 3. 7½ x 5.

A lively description of a Frenchman's pleasure trip along a segment of the

Arctic Circle, through Denmark, Norway and Sweden, returning by Berlin and Cologne. "Mon sleeping car" and "des barmaids" are perfectly at home in the writer's French style. The bathing costumes, or rather lack of costumes, of the Scandinavians remind the tourist of Japan of Pierre Loti. The fiords and northern lights attract his attention. He is also interested in the Salvation Army lassies. The arrival of a yacht flying the Stars and Stripes catches his eye and from the elegance of all the appointments he surmises that the proprietors must belong to the Four Hundred; but although he sees them in their motorboat, "a land magnate" and "a tall blonde Americaine," they depart before he can meet them.

DAVID H. BUEL.

Bulgaria and Her People. With an account of the Balkan Wars, Macedonia, and the Macedonian Bulgars. By Will S. Monroe. xxi and 410 pp. Map, ills., index. The Page Co., Boston, 1914. $3. 8½ x 6.

An unusually complete and accurate account of Bulgaria and her people. After brief and clear accounts of the geography, ethnology, and earlier history of Bulgaria, the discussion of the second Balkan war follows. The writer was on the field and carefully questioned the people he met. He agrees with the findings of the Carnegie Commission, copious extracts of which are given, that Servia and Greece combined against Bulgaria and provoked the war.

DAVID H. BUEL.

THE WORLD AND PARTS OF IT

Die Deutschen Kolonien. Herausgegeben von A. D. Kurd Schwabe. Vol. 1: Togo—Kamerun—Deutsch-Südwestafrika. 160 pp. Vol. 2: Deutsch-Ostafrika—Kaiser-Wilhelmsland und die Inselwelt im Stillen Ozean—Samoa—Kiautschou. 164 pp. Ills. Weller & Hüttich, Berlin, 1914. Mk. 150. 16½ x 13.

We have here a work that is highly commendable in every particular. Its two volumes in the form of tall folios are truly sumptuous, enriched with every device of typography and illustration which the high skill of German printers can compass. Sometimes works of such luxury lack value, but that is not the case here. Major Schwabe has called to his assistance the acknowledged authorities upon the history and administration of each of the German colonies.

In the first volume we have Togo, Kamerun and German Southwest Africa; in the second, German East Africa, Kaiser Wilhelmsland, the Pacific islands, and Kiau-chau. It is frankly acknowledged that the last of these has value only in strategy, and that it has been held only as a check against adverse diplomacy and as a resting place whereupon the empire may claim the right to be considered in the affairs of China and of the Orient at large.

The economic value of German Southwest Africa will probably long remain in its mineral wealth, though stock-raising will also have much development; but the tropical colonies are at present and probably for all time to come will be agricultural. Initial effort has been in the hands of plantation development companies, but the aim has been to attract capable men to small holdings obtainable on easy terms and to promote small farms. This has involved the question of cheap labor, and no system has yet been developed, even by the Germans, whereby cheap labor can be made economical. Experiments have been conducted in each of these tropical colonies whereby diversity of product may be obtained; and there have been government gardens for the introduction of rubber, cacao, spices, drug plants, etc. The home market can absorb enormously the greatest diversity of raw material, and the more the colonies can be employed in the production of these raw materials the better showing in the balance of trade.

The experiment has now been rudely interrupted; but whatever the outcome, it cannot wipe out the fact that these are among the richest spots of earth.

Major Schwabe and his collaborators, in these volumes, have given us a most complete and valuable record of all the colonies of the German Empire up to their last moment of peace. The work is an interesting record of carefully planned exploitation of the natural wealth of the tropics.

WILLIAM CHURCHILL.

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NEW MAPS

EDITED BY THE ASSISTANT EDITOR

For system of listing maps see p. 75 of this volume

NORTH AMERICA

UNITED STATES

California-Nevada, etc. Geomorphic Map of California and Nevada with Portions of Oregon and Idaho, showing the diastrophic character of the relief, the steep descent from the sub-continental shelf to the floor of the Pacific, and the more important known faults. Authorities for the position of faults: I. C. Russell, O. H. Hershey, H. W. Fairbanks, J. S. Diller, W. C. Mendenhall, F. M. Anderson, R. Arnold, H. W. Turner, J. C. Branner, W. Lindgren and A. C. Lawson. Drawn by M. Solem. [1:1,900,000]. 43⅔° - 32⅚° N.; 124⅔°-113⅓° W. 3 colors. Accompanies, as map No. 1, "Atlas Accompanying the Report of the State Earthquake Investigation Commission upon the California Earthquake of April 18, 1906," Carnegie Institution, Washington, 1908.

[Although the atlas in which this map is contained was reviewed in the *Bulletin* at the time (Vol. 41, 1909, p. 469), it is thought worth while to single out this map for comment. No general map of this region known to the writer since Lieut. G. K. Warren's map of the western United States, 1:3,000,000, published at the time of the surveys by the Army engineers, shows relief so well as this one. While we have in this country, in the domain of scientific cartography, developed to a high degree of efficiency the representation of relief on detailed topographic maps, we are not so successful as regards general maps. These require generalization, in relief as in their other elements, and here the contour method, as used, for instance, on the standard general map of the United States published by the U. S. Geological Survey (see on this point, under "United States," *Bull.*, Vol. 46, 1914, p. 394), is unsatisfactory. Contours, unsupported by hypsometric tints, on a general map do not give a synoptic view of relief and, even when thus supplemented, fail to express relief between

their vertical contour interval. For general maps, shading and hachuring are by far the better methods. It is the use of one of these methods, viz., shading, which gives the present map its value. Evidently based on all the material available, and in consequence of its relatively large scale, it affords a finely modelled view of the relief of the region. The addition of the more important fault lines explains the title of the map; it is not a geomorphological map, however, in the sense of distinguishing between different structural areas.]

CENTRAL AMERICA AND WEST INDIES

Panama Canal Zone. Panama Canal to illustrate a paper by Vaughan Cornish, D.Sc. 1:400,000. 9°40′ - 8°45′ N.; 80°10′ - 79°10′ W. 1 color. With small inset of the isthmian region [1:20,000,000]. Accompanies "The Conditions and Prospects of the Panama Canal" by V. Cornish, *Geogr. Journ.*, Vol. 44, 1914, No. 21, pp. 189-203.

[Based on the map appearing in the report of the Isthmian Canal Commission.]

SOUTH AMERICA

Colombia–Brazil. The N. W. Amazon Basin from Surveys by Hamilton Rice, B.A., M.D., F.R.G.S. (Gold Medallist), 1907-8 and 1912-13. 1:1,000,000. 4°10′ N. - 0°10′ S.; 72°45′ - 67°5′ W. 2 colors. With two insets: (1) Continuation of map. Same scale. 4°45′ - 3°20′ N.; 74°10′ - 72°25′ W. 2 colors. (2) [Map of northern South America], 1:30,000,000, [showing location of main map]. Accompanies "Further Explorations in the North-West Amazon Basin" by H. Rice, *Geogr. Journ.*, Vol. 44, 1914, No. 2, pp. 137-168.

[Important map embodying original surveys of the Inirida, Içana and Uaupés Rivers, the first belonging to the drainage system of the Orinoco, the second and third to that of the Rio Negro. The course of the Uaupés is taken from the previous map published in 1910 in Vol. 35 of the *Geographical Journal*, thus affording a valuable synopsis of all of Dr. Rice's surveys in this region. A note on the map says that it is based on compass surveys, adjusted to astronomical positions. Latitudes were determined with a 4-inch transit theodolite, longitudes by three chronometer watches. Heights were determined by aneroid checked by boiling-point thermometer.]

Peru. Pampaconas River. 1:350,000. 12°50′ - 13°10′ S.; 73°33′ - 72°58′ W. With inset, 1:14,000,000, showing location of main map. Accompanies, on p. 212, "The Pampaconas River" by H. Bingham, *Geogr. Journ.*, Vol. 44, 1914, No. 2, pp. 211-214.

[The map, which is the result of a survey in Sept., 1911, by K. Hendriksen, topographer of the Yale Peruvian Expedition, shows only the head of the Pampaconas valley. From here the Pampaconas is said to flow north into the Urubamba, where it may be identical with the Sirialo or the Coribeni, shown on Isaiah Bowman's survey of the bend of the Urubamba, published in this *Bulletin*, Vol. 44, 1912, facing p. 896. This is a modification of our present knowledge, as existing maps, such as that entitled "South Peru and North Bolivia," 1:2,000,000, published in the *Geographical Journal* for 1910 (see under "Bolivia-Peru," *Bull.*, Vol. 42, 1910, p. 873), show no stream of any size between the Urubamba and the Apurimac in this region. The author, in the text, states that on this map the confluence of the Apurimac and the Pampas is incorrectly located. Instead of occurring in 13°15′ S. and 72°57′ W., as there shown, it lies in 13°26′ and 73°13′.]

AFRICA

British East Africa. (a) Sketch map of the Country in the Vicinity of Lake Magadi. 1:2,000,000. 4⅕° - 2⅘° S.; 35½° - 37½° E.

(b) Sketch Map of Part of Rift Valley in the neighborhood of Lake Magadi, showing principal faults. 1:300,000. [1⅝° S. and 36¼° E.]

Accompany, as sketch maps 2 and 3 on pp. 35 and 37, "The East African

Trough in the Neighbourhood of the Soda Lakes'' by J. Parkinson, *Geogr. Journ.*, Vol. 44, 1914, No. 1, pp. 33-49.

[Lake Magadi is one of the alkaline lakes in the East African Rift Valley, just north of the boundary between British and German East Africa. It is accessible by branch railroad from the Mombasa-Port Florence railroad.]

ASIA

Turkey in Asia. Sketch Map of Dersim showing the routes followed by Capt. L. Molyneux-Steel, 1911. 1:1,000,000. 39°43′ - 38°38′ N.; 38°19′ - 40°44′ E. With inset showing location of main map. Accompanies, facing p. 50, ''A Journey in Dersim'' by L. Molyneux-Steel, *Geogr. Journ.*, Vol. 44, 1914, No. 1, pp. 49-68.

[Region is in Armenia in rectangle formed by the Kara Su and the Murad Su, the two source-streams of the Euphrates. Relief in wash, reproduced in half-tone. A note at the end of the paper says that the map has been constructed from a prismatic compass traverse, checked by observations for latitude taken at eight points with a 7-inch sextant.]

WORLD AND LARGER PARTS

Pacific Ocean. (a) Part of the Pacific Ocean to illustrate the paper by Basil Thompson. Mercator's projection, equatorial scale 1:50,000,000. 36° N. - 38° S.; 117° E. - 75° W. 1 color.

(b) The Chart of the Spanish galleon taken by Commodore Anson from the N[uestra] S[eñora] de Cabadonga in 1743. [Equatorial scale, 1:24,000,000]. 39½° N. - 0°; 123° E. - 97° W.

[Map (a) is simply a locational map whose purpose could equally well be served by any general atlas. Map (b) is a facsimile of an English chart entitled ''A Chart of the Pacific Ocean from the Equinoctial to the Latitude of 39½° No.,'' engraved by R. W. Seale (?), showing the track of the Spanish galleon *Nuestra Señora de Cabadonga* from Manila to Acapulco and back to the Philippines, where, as the chart informs us, ''she was taken by Commodore Anson in the *Centurion*, the 30th of June, 1743.'' The track of the *Centurion* from Acapulco to Guam, paralleling that of the Spanish galleon, and thence to China, is also shown.]

EDUCATIONAL

North and South America, Algeria and Tunis. [Three wall maps:] (1) Continent américain: carte physique. Par P. Vidal-Lablache. 1:15,000,000. 84° N. - 59° S.; 175° W. - 18° E. 9 colors. With inset: Situation centrale du continent américain. [World on Mollweide's projection, equatorial scale 1:125,000,000.] (2) Algérie et Tunisie: carte physique. Par P. Vidal-Lablache. 1:1,300,000. 38¼° - 27½° N.; 3⅜° W. - 12° E. 6 colors. With inset: Afrique: régions naturelles [vegetation]. 1:50,000,000. 6 colors. (3) Algérie et Tunisie: carte politique. Par P. Vidal-Lablache. Same scale and coordinates as map (2). 6 colors. With inset: Possessions françaises en Afrique. 1:50,000,000. 2 colors. Cartes 18*bis*, 11 and 11*bis*, respectively, in series ''Cartes murales Vidal-Lablache,'' A. Colin, Paris.

[These maps belong to an excellent series of school wall maps edited by Professor Vidal de la Blache. While the majority represent the same areas as other similar series, some maps, such as those here listed, are distinctive. Map (1) is an excellent physical map of North and South America together, making it possible, as the maps of the separate continents do not, to bring out their mutual relations; the inclusion of western Europe and Africa affords an additional point of reference. The only other physical wall map of North and South America together known to the writer is that by Gaebler, 1:12,000,000; but the projection there chosen distorts far more than in the present case. Maps (2) and (3) are valuable because they represent the area on a far larger scale than usually available in a wall map. On the physical map relief is shown in the usual hypsometric coloring supplemented by shading. The political map

shows towns, railroads, caravan routes, and chief products. On both the names are printed boldly so as to be legible at a distance. Map (1) is "mute," i. e., there are no names. The principal features are numbered; these numbers correspond to names on the edition with names of the same map. Editions with and without names are published of all the continents and of France in this series.]

Other Maps Received

NORTH AMERICA

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British Columbia. British Columbia. Land Recording Divisions. 1:1,900,800. Dept. of Lands, Victoria, 1913.

British Columbia. Land districts. 1:1,900,800. Dept. of Lands [Victoria], 1913.

British Columbia. Mining Divisions. 1:1,900,800. Dept. of Lands, Victoria, 1913.

Pre-Emptor's Map [of British Columbia]. 3 mi. to 1 in. Sheets: Bulkley, 1913; Fort George, 1914; Lillooet, 1913; Nechako, 1914; Peace River, 1914; Stuart Lake, 1914. Department of Lands, Victoria.

Southerly portion of Vancouver Island. 1:253,440. Dept. of Lands, Victoria, 1913.

South Western Districts. 12 mi. to 1 in. Dept. of Lands, Victoria, 1912.

Sketch map of Crown Lands Range 5, Coast Dist., Bulkley River. 1 in. to 1 mi. [Dept. of Lands, Victoria, 1914.]

Map 136A, Hazelton-Aldermere, Cassiar and coast districts, British Columbia. 1:253,440. Geological Survey, Dept. of Mines, Ottawa, 1914.

New Westminster and Yale. 1:253,440. Dept. of Lands, Victoria, 1914.

Map of Yale district and portion of adjacent districts, British Columbia. 8 mi. to 1 in. Land & Wks. Dept., Victoria, 1912.

Canada. Sectional Map [of Canada]. 1:190,080. Sheet 318, Shell River; 416, La Biche; 465, Pelican; 513, Heart River; 515, Wabiskaw; 563, Notikewin; 566, McKay; 663, Mustus; 664, Mikkwa. [Department of the Interior, Ottawa], 1914.

Standard Topographical map. 1:250,000. Sheet 8 N. W., Cartier, Ontario, portions of Algoma and Sudbury Districts. Department of the Interior, Ottawa, 1914.

UNITED STATES

Alaska. Map of Alaska by the Alaska Road Commission. 1:1,250,000. The Board of Road Commissioners, Valdez, Alaska, 1913.

California. Panama-Pacific Exposition. 625 acres. 250 ft. to 1 in. Aug. Chevalier, San Francisco, 1912.

Illinois. Railroad map of Illinois. 8 mi. to 1 in. State Public Utilities Commission of Illinois. [Springfield, Ill.], 1915.

Mississippi. City of Jackson, Mississippi. 1 in. to 1,125 ft. Office of City Engineer, Jackson, 1914.

New York. Electric Railroad map of the State of New York to accompany the Annual Report of the Public Service Commission, Second District, State of New York, 1914. 7½ mi. to 1 in. [Gift from Matthews-Northrup Co.]

Tentative Map of the Borough of Queens. 1:9,600. Sheets: [Town of Newtown]; "Corona Map," 1909; "Flushing Map," 1912; "Hollis Map,"

1913; "Bayside Map," 1913; "Black Stump Map," 1914; "Aqueduct Map," 1911; [A portion of 2nd ward (town of Newtown)], 1903; "Rockaway Beach Map," 1912; "Far Rockaway Map," 1912; [A portion of 2nd and 4th wards], 1905; [Another portion of 2nd ward (town of Newtown)], 1905; "Jamaica Map," 1912. Topographical Bureau, Office of the President of Borough of Queens, City of New York.

Final Maps of the Borough of Queens. 1:2,400. Sections 2-12, 14-16, 18, 21-24, 26, 28, 29, 32, 34-37, 39, 40, 42-47, 62, 63, 66, 67, 110, 119, 122, 123, 126, 175, 318. Topographical Bureau, Office of the Borough of Queens, City of New York 1908-1914.

United States. United States. Oil and Gas Fields in 1913. 1:2,500,000. U. S. Geological Survey, Washington, D. C., 1914.

[Map of U. S. showing states won to Woman Suffrage]. National Woman Suffrage Pub. Co., New York, 1914.

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(b) Edition with contours and shading. Sheets 38P, 39I, 43B, 46K, 49M, 49N, 55H, 79C, 79G, 79K, 92K, 93K (old no. 67), 93L (old no. 68).

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